Chapter 1 : Full text of "Sediment bioassay research and development"

Development of full or partial life cycle tests with reproductive success as an additional endpoint Introduction of the routine use of reference toxicants as a means of ensuring comparable sensitivity of test organisms for each bioassay conducted Calibration of growth on the basis of substrate conditions Further investigations into sediment.

Expand all Selected publicaitons in print Templeton, R. Lifecycle effects of single-wall carbon nanotubes SWNTs on an estuarine meiobenthic copepod. Cathepsin B and glutathione peroxidase show differing transcriptional responses in the grass shrimp, Palaemonetes pugio, following exposure to three xenobiotics. Environmental Science and Technology Further application of a copepod-based full life-cycle bioassay. Environmental Toxicology and Chemistry Individual to population effects of South Louisiana crude-oil water hydrocarbon accommodated fraction WAF on a marine meiobenthic copepod. Journal of Experimental Marine Biology and Ecology Geochimica Cosmochimica Acta Influence of natural dissolved organic matter DOM on acute and chronic toxicity of the pesticides chlorothalonil, chlorpyrifos and fipronil on the meiobentic estuarine copepod Amphiascus tenuiremis. Experimental Marine Biology and Ecology Mercury body burdens in Gambusia holbrooki and Erimyzon sucetta in a wetland mesocosm amended with sulfate. Atrazine effects on meiobenthic assemblages of a modular estuarine mesocosm. Marine Pollution Bulletin Population consequences of fipronil and degradates to copepods at field concentrations: Toxicity assessment of sediments associated with various land-uses in coastal South Carolina, USA, using a meiobenthic copepod bioassay. A physicochemically-constrained seawater culturing system for production of benthic foraminifera. Limnology and Oceanography - Methods 2: Semi-quantitative confocal laser scanning microscopy applied to marine invertebrate ecotoxicology. Fipronil effects on copepod development, fertility, and reproduction: A rapid life-cycle assay in well microplate format. Toxicity assessment of sediments associated with various land uses in coastal South Carolina, USA, using a meiobenthic copepod bioassay. Use of the fluorescent calcite marker calcein to label foraminiferal tests. Methylmercury formation in a wetland mesocosm amended with sulfate. Assessing photoinduced toxicity of polycyclic aromatic hydrocarbons in an urbanized estuary. Ecology and Society 9: An enzyme-linked immunosorbent assay for lipovitellin quantification in copepods: A comparative assessment of Azinphosmethyl bioaccumulation and toxicity in two estuarine meiobenthic harpacticoid copepods. Reproductive and developmental effects of atrazine on the estuarine meiobenthic copepod, Amphiascus tenuiremis. Bioavailability of the organophosphorous insecticide chlorpyrifos to the suspension-feeding bivalve, Mercenaria mercenaria, following exposure to dissolved and particulate matter. Ecdysteroid distribution through various life-stages of the meiobenthic harpacticoid copepod, Amphiascus tenuiremis, and the benthic estuarine amphipod, Leptocheirus plumulosus. General and Comparative Endocrinology Agricultural and urban NPS runoff effects on grass shrimp population life history dynamics. Integrative and Comparative Biology A comparison of the daphniidsCeriodaphnia dubia and Daphnia ambigua for their utilization in routine toxicity testing in the southeastern United States. Archives of Environmental Contamination and Toxicology Techniques for micromass body burden and total lipid analysis. Purification and characterization of the common yolk protein, vitellin, from the estuarine amphipod Leptocheirus plumulosus. Preparative Biochemistry and Biotechnology Endocrine-mediated effects of UV-A irradiation on grass shrimp Palaemonetes pugio reproduction. Comparative Biochemistry and Physiology C Toxicological studies in tropical ecosystems: An ecotoxicological risk assessment of pesticide runoff in South Florida estuarine ecosystems. Journal of Agricultural and Food Chemistry Effect of salinity variation and pesticide exposure on an estuarine harpacticoid copepod, Microarthridion littorale Poppe , in the southeastern US. Development-stage specific life-cycle bioassay for assessment of sediment-associated toxicant effects on benthic copepod production. Bioavailability of particle-associated silver, cadmium, and zinc to the estuarine amphipod Leptocheirus plumulosus through dietary ingestion. Limnology and Oceanography Dietary assimilation of cadmium associated with bacterial exopolymer sediment coatings by the estuarine amphipodLeptocheirus plumulosus: Effects of Cd concentration and salinity. Marine Ecology Progress Series Field assessment for endocrine disruption in invertebrates, pp. Endocrinology, Testing and Assessment.

Coastal development impact on land-coastal waters. Utility of a full life-cycle bioassay approach with meiobenthic copepods for assessment of sediment-associated contaminant mixtures. Molecular population structure of the marine harpacticoid copepod Microarthridion littorale along the Southeastern and Gulf of Mexico coasts of the United States. Assessment of risk reduction strategies for the management of agricultural nonpoint source pesticide runoff in estuarine ecosystems. Predation on meiofauna by juvenile spot Leiostomus xanthurus: Stable isotope behavior in paleoceanographically important benthic foraminifera: Results from microcosm culture experiments. Journal of Foraminiferal Research A laboratory and field comparison of sediment PAH bioaccumulation by the cosmopolitan estuarine polychaete Streblospio benedicti Webster. Journal of Marine Environmental Research Sorption of cadmium to bacterial extracellular polymeric sediment coatings under estuarine conditions. A culture-based assessment of chlorpyrifos effects on multiple meiobenthic copepods using microcosms of intact estuarine sediments. Life-table evaluation of sediment-associated chlorpyrifos chronic toxicity to the benthic copepod, Amphiascus tenuiremis. A day harpacticoid copepod reproduction bioassay for laboratory and field contaminated muddy sediments. Sediment microhabitats and stable isotope disequilibria phenomena in microcosm cultured benthic foraminiferal calcite. Life-stage specific toxicity of sediment-associated chlorpyrifos to a marine infaunal copepod. Sublethal effects of cadmium on arm regeneration in the burrowing brittlestar, Microphiopholis gracillima Stimpson Echinodermata: Urbanization effects on the fauna of a southeastern U. Baruch Library in Marine Science, No. Age-specific survival analysis of an infaunal meiobenthic harpacticoid copepod, Amphiascus tenuiremis. Meiofaunal bioturbation effects on the partitioning of sediment-associated cadmium. Sediment and aqueous-phase fenvalerate effects on meiobenthos: Implications for sediment quality criteria development. Marine Environmental Research Aqueous, porewater and sediment phase cadmium: Toxicity relationships for a meiobenthic copepod. Lethal and sublethal effects of the sediment-associated PCB Aroclor on a meiobenthic copepod. Population growth of a meiobenthic copepod under exposure to the sediment-associated pyrethroid insecticide fenvalerate. Archives of Environmental Contamination and Toxicology, Field, laboratory and mesocosm studies. Morphologic variability in an environmentally-controlled clonal culture of Ammonia beccarii. Effects of sediment-bound endosulfan on survivorship, reproduction and larval colonization of meiobenthic copepods and polychaetes. Effects of sediment-bound residues of the synthetic pyrethroid insecticide fenvalerate on survival and reproduction of meiobenthic harpacticoid copepods. Foraminifera may structure meiobenthic communities. Facilitative and inhibitory interactions among estuarine meiobenthic harpacticoid copepods. High density culture of meiobenthic harpacticoid copepods within a muddy sediment substrate. Canadian Journal of Fisheries and Aquatic Sciences Tube-building by a marine meiobenthic harpacticoid copepod. The effects of tidal currents on meiofauna densities in vegetated salt marsh sediments. Meiofauna responses to an experimental oil spill in a Louisiana salt marsh. Meiofaunal colonization of azoic estuarine sediments in Louisiana:

Chapter 2 : Details - Sediment bioassay research and development / - Biodiversity Heritage Library

The Biodiversity Heritage Library works collaboratively to make biodiversity literature openly available to the world as part of a global biodiversity community.

In fact, most established consumer goods companies dedicate a significant part of their resources towards developing new versions of products or improving existing designs. However, where most other firms may only spend less than 5 percent of their revenue on research, industries such as pharmaceutical, software or high technology products need to spend significantly given the nature of their products. Basic Research When research aims to understand a subject matter more completely and build on the body of knowledge relating to it, then it falls in the basic research category. This research does not have much practical or commercial application. The findings of such research may often be of potential interest to a company Applied Research Applied research has more specific and directed objectives. These investigations are all focused on specific commercial objectives regarding products or processes. Development Development is when findings of a research are utilized for the production of specific products including materials, systems and methods. Design and development of prototypes and processes are also part of this area. A vital differentiation at this point is between development and engineering or manufacturing. Development is research that generates requisite knowledge and designs for production and converts these into prototypes. Engineering is utilization of these plans and research to produce commercial products. Thought there is often overlap in all of these processes, there still remains a considerable difference in what they represent. This is why it is important to understand these differences. This is systematic creative work, and the resulting new knowledge is then used to formulate new materials or entire new products as well as to alter and improve existing ones Innovation Innovation includes either of two events or a combination of both of them. These are either the exploitation of a new market opportunity or the development and subsequent marketing of a technical invention. A technical invention with no demand will not be an innovation. New Product Development This is a management or business term where there is some change in the appearance, materials or marketing of a product but no new invention. It is basically the conversion of a market need or opportunity into a new product or a product upgrade Design When an idea is turned into information which can lead to a new product then it is called design. This term is interpreted differently from country to country and varies between analytical marketing approaches to a more creative process. Product Design Misleadingly thought of as the superficial appearance of a product, product design actually encompasses a lot more. It is a cross functional process that includes market research, technical research, design of a concept, prototype creation, final product creation and launch. Usually, this is the refinement of an existing product rather than a new product. Often, the required knowledge already exists and can be acquired for a price. The influence of the following factors can help make this decision. Proprietariness If the nature of the research is such that it can be protected through patents or non-disclosure agreements , then this research becomes the sole property of the company undertaking it and becomes much more valuable. Patents can allow a company several years of a head start to maximize profits and cement its position in the market. On the other hand, if the research cannot be protected, then it may be easily copied by a competitor with little or no monetary expense. In this case, it may be a good idea to acquire research. In a fast paced environment, competitors may rush ahead before research has been completed, making the entire process useless. In this regard, it may be desirable to acquire the required research to convert it into necessary marketable products. There is significantly less risk in acquisition as there may be an opportunity to test the technology out before formally purchasing anything. Cost Considering the long term potential success of a product, acquiring technology is less risky but more costly than generating own research. This is because license fees or royalties may need to be paid and there may even be an arrangement that requires payments tied to sales figures and may continue for as long as the license period. There is also the danger of geographical limitations or other restrictive caveats. In addition, if the technology changes mid license, all the investment will become a sunk cost. There needs to be massive initial investment that leads to negative cash flow for a long time. But it does protect the company from the rest of the limitations of acquiring research. All these aspects need to be carefully assessed and a pros vs. Manufacturers of a variety of products utilize this process for new product development and innovation. Though each company or industry may have its own unique research methodology, a basic research process will form the framework for it. Foster Ideas At this point the research team may sit down to brainstorm. The discussion may start with an understanding and itemization of the issues faced in their particular industry and then narrowed down to important or core areas of opportunity or concern. Focus Ideas The initial pool of ideas is vast and may be generic. The team will then sift through these and locate ideas with potential or those that do not have insurmountable limitations. At this point the team may look into existing products and assess how original a new idea is and how well it can be developed. Develop Ideas Once an idea has been thoroughly researched, it may be combined with a market survey to assess market readiness. Ideas with true potential are once again narrowed down and the process of turning research into a marketable commodity begins. Prototypes and Trials Researchers may work closely with product developers to understand and agree on how an idea may be turned into a practical product. As the process iterates, the prototype complexity may start to increase and issues such as mass production and sales tactics may begin to enter the process. Regulatory aspects are assessed and work begins to meet all the criteria for approvals and launch. The marketing function begins developing strategies and preparing their materials while sales, pricing and distribution are also planned for. Launch The product that started as a research question will now be ready for its biggest test, the introduction to the market. The evaluation of the product continues at this stage and beyond, eventually leading to possible re-designs if needed. At any point in this process the idea may be abandoned. Its feasibility may be questioned or the research may not reveal what the business hoped for. It is therefore important to analyze each idea critically at every stage and not become emotionally invested in anything. It can significantly contribute towards organizational growth and sustained market share. However, all business may not have the necessary resources to set up such a function. When all employees are encouraged to think creatively and with a research oriented thought process, they all feel invested in the business and there will be the possibility of innovation and unique ideas and solutions. This mindset can be slowly inculcated within the company by following the steps mentioned below. If it is successful, encourage employees to identify reasons for success so that these can then be used as benchmarks or best practices. If the product is not doing well, then encourage teams to research reasons why. Identify Objectives Allow your employees to see clearly what the business objectives are. The end goal for a commercial enterprise is to enhance profits. If this is the case, then all research the employees engage in should focus on reaching this goal while fulfilling a customer need. Define and Design Processes A definite project management process helps keep formal and informal research programs on schedule. Realistic goals and targets help focus the process and ensures that relevant and realistic timelines are decided upon. Create a Team A team may need to be created if a specific project is on the agenda. This team should be cross functional and will be able to work towards a specific goal in a systematic manner. If the surrounding organizational environment also has a research mindset then they will be better prepared and suited to assist the core team when ever needed. Outsource Whenever needed, it may be a good idea to outsource research projects. Universities and specific research organizations can help achieve research objectives that may not be manageable within a limited organizational budget. These include the following. Tax breaks Research and Development expenses are often tax deductible. This depends on the country of operations of course but a significant write-off can be a great way to offset large initial investments. But it is important to understand what kind of research activities are deductible and which ones are not. Generally, things like market research or an assessment of historical information are not deductible. Costs A company can use research to identify leaner and more cost effective means of manufacturing. This reduction in cost can either help provide a more reasonably priced product to the customer or increase the profit margin. Financing When an investor sets out to put their resources into any company, they tend to prefer those who can become market leaders and innovate constantly. Recruitment Top talent is also attracted to innovative companies doing exciting things. With a successful Research and Development function, qualified candidates will be excited to join the company. These can help them gain market advantage and cement their position in the industry. This one time product development can lead to long term profits. These may include the following.

High Costs Initial setup costs as well as continued investment are necessary to keep research work cutting edge and relevant. Not all companies may find it feasible to continue this expenditure. Uncertain Results Not all research that is undertaken yields results. Many ideas and solutions are scrapped midway and work has to start from the beginning. It is important for any business to understand the advantages and disadvantages of engaging in Research and Development activities. In the meanwhile, it is good practice to inculcate a research mind set and research oriented thinking within all employees, no matter what their functional area of expertise. This will help bring about new ideas, new solutions and an innovative way of approaching all business problems, whether small or large.

Chapter 3 : Development Of Bioassay Procedures For Defining Pollution Of Harbor Sediments

Topics: Aquatic organisms, Effect of water pollution on, Pollution, Toxicity testing, Toxicology, Water, Water quality bioassay.

Ted Morris This research investigates bioassay methods which may be useful in assessing the degree of pollution of harbor sediments. Procedures studied include hr toxicity tests employing Hexagenia limbata, Daphnia magna and Pontoporeia affinis as biological probes, monitoring cough frequencies of bluegill sunfish Lepomis macro- chirus in interstitial water derived from sediments, chemical analyses of sediment-water systems, and chemical analysis of chironomids and Hexagenia limbata exposed to the sediments. Additional experiments involved investigation of the degree of removal of chemical constituents from sediments due to extraction with Lake Superior water and the use of reverse phase liquid chromatography in detecting the presence of chemical compounds with high bioaccumula- tion potential in the sediments. Sediment-water systems, employ- ing sediments from the Duluth- Superior harbor and Lake Superior, caused little toxicity in hr exposure tests with Daphnia magna, Hexagenia limbata and Pontoporeia affinis al- though Daphnia was the most sensi- tive of these animals to toxicants. Most of the sediments used in the bioassay tests would be considered polluted according to at least one chemical parameter. Chemical analy- ses showed the presence of low amounts of PCBs in the sediments. Most of the heavy metals primarily resided in the residual phase of the sediments. Studies on extracting chemical species from the sediments showed that only small amounts could be readily extracted with Lake Superior water. A general toxicity index was pre- pared from the chemical data which indicated that animal survival in the hr acute toxicity tests was generally lower using sediment systems from the more industrialized areas of the harbor. Reliable, cost-effective procedures for identifying the potential effects of sediment chemical contami- nants on water quality and aquatic communities are needed. Current criteria used for the evalua- tion of the quality of Great Lakes harbor sediments are based largely on sedi- ment chemical parameters. It is recog- nized that a comprehensive evaluation procedure should include short-term bioassay tests in evaluating the toxic effects of sediments on fish, benthos and plankton; and also tests which will assess the bioaccumulation potential of sediment chemicals in flora and fauna resulting in magnification in aquatic food chains. This research attempts to develop procedures designed to assess potential harmful effects of harbor sediments subjected to dredging. Applicability, ease of duplication and cost effective- ness were taken into consideration in procedure development. Sediments collected during and from six sites in Duluth, Minne- sota and Superior, Wisconsin harbor area and one Lake Superior site were used in preparing systems containing water overlying a sediment substrate, containing interstitial water, or containing elutriate water. Acute hr toxicity tests were carried out by exposing Hexagenia limbata, Daphnia magna and Pontoporeia affinis to certain of these systems compared to exposures to identically prepared controls. The exposure systems consisted of sediment, water overlying the sedi- ment, interstitial water extracted from the sediment under anaerobic condi- tions, elutriate water prepared from Lake Superior water mixed with sedi- ment which was either exposed to air or kept under nitrogen prior to elutri-ate formation and Lake Superior water used to extract water solubles or colloids generated pore water. During , particulate phase elutriate water was also used as an animal exposure system. All bioassays were conducted in an environmentally controlled area of the University of Wisconsin-Superior wet laboratory under controlled light and temperature conditions. Oversediment bioassays were designed to incorporate the mechanisms for transfer of toxic substances between sediments and benthic or planktonic communities using Daphnia magna and Hexagenia limbata. Pontoporeia affinis bioassays were used to measure acute toxicity of liquid phase elutriate water. Ninety-six hr toxicity tests employing Daphnia magna exposed to sediment interstitial water and elutriate water were also conducted. Bluegill sunfish Lepomis macro- chirus were monitored for cough frequencies and breathing patterns in mixtures of Lake Superior water with interstitial water extracted from the various sediments. Sixteen fish of com- parable size were used in each test. The tests were conducted in systems composed of electrode chambers con- taining separated compartments. Each compartment was equipped with stain- less steel electrodes which detected action potential resulting from muscu- lar activity associated with breathing. The bluegill breathing patterns and cough responses were recorded for fish in dechlorinated city water and in Lake Superior-sediment interstitial water mixtures. Sediments and interstitial waters used in bioassay tests were extensively analyzed for a variety of chemical parameters. The chemical testing of sediments included determinations of total metals, metals associated with dif- ferent phases of the sediments, certain inorganic non-metal substances, parti- cle size, pH, Eh and some trace organics PCBs, pesticides and PAH compounds. Chemical tests on interstitial water included a number of the same chemical parameters as investigated for sediments. Chironomids were collected from various harbor sites by isolating them from sieved sediment. These chirono- mids, along with Hexagenia limbata exposed for 96 hrs to harbor sediments, were analyzed to -determine body burdens of specific organic compounds PCBs, PAH and pesticides and some heavy metals. Using the results from the animal toxicity tests and the chemical analyses, attempts were made to develop a general index of toxic potential and chemical quality of harbor sediments in trying to identify correlations between sediment chemistry and animal survival for the acute toxicity tests. The degree of removal of chemical constituents from sediments subjected to mixing with Lake Superior water was investigated by repetitive additions of Lake Superior water to sediments, separating the water from the sedi- ments by high speed centrifugation and chemical analysis of the water phases. The total amount of each chemical released from the sediments to the water phase after numerous additions and removal of water was tabulated. The concentrations of organic chemi- cals with high bioaccumulation poten- tial contained in harbor sediments, harbor chironomids, and sediment exposed Hexagenia limbata were inves- tigated using high pressure reverse phase liquid chromatography. The chemicals having high partition coefficients tend to have high retention times on a reverse phase chromatographic column. Organic solvent extracts from harbor sediments, chironomids and Hexagenia were injected into a high pressure liquid chromatograph employ- ing a reverse phase column. Eluted compounds were detected by a UV detector. Conclusions The acute toxicity tests using I sediment-water systems resulted in " generally low toxicity to Hexagenia limbata, Daphnia magna and Ponto- poreia affinis. The high survival of test animals indicated low levels of available toxicants in the sediments. In hr bioassays, survival was found to be significantly lower for test sites com- pared to controls in only a few tests. The results demonstrated that the animals could be successfully maintained in the complex test systems and that the sediment-water systems caused low acute toxicity. This low toxicity in combination with low precision between replicates generally resulted in finding no significant differences in animal survival between test and control. Among the test species employed, Daphnia magna appeared to be the most sensitive to toxicants. It was necessary to design the tests following approved criteria for ecolog- ical evaluation of dredging and dredge spoil disposal in marine systems. Following these criteria, controls for the bioassay tests were derived from sedi- ments from Lake Superior and a rela- tively undisturbed area of the harbor. Because these sediments contained varying quantities of many toxic M substances, their use negated accurate determination of the sensitivity of the bioassay procedures. It is therefore recommended that future studies aimed at identifying screening procedures incorporate more effective controls. The use of Daphnia magna, Hexagenia limbata or Pontoporeia affinis as test organisms for potential toxic effects of sediments should be considered further. Of these species, Daphnia magna appears to be most suited as a test organism due to ease of culturing, sensitivity, and the large amount of information available on the response of Daphnia to specific chemi- cals. Further tests would be useful employing sediment samples having greater variation in chemical quality. Recognizing that sediments used in this study contained large quantities of potentially toxic heavy metals in unavailable or non-toxic forms, it is important to develop better understanding of the conditions which would result in transformation to available forms and the effects that such transformations woud have. Comparisons of toxicity results to other recently developed toxicant screening techniques such as algal or luminescent bacteria assays are recommended. The average cough frequencies of bluegills in dechlorinated city water and in interstitial water from the sampling site sediments mixed with Lake Superior water were generally similar. Cough frequencies during the first 22 to 25 hrs of fish exposure were found to be elevated above the frequencies observed for the control for three of the six sites studied. Based on our observations, bluegill cough frequencies are difficult to inter- pret and their usefulness in determining differences in sediment quality was limited due to observed similarities in results for the various sites. The data suggests that extensive experience in conducting fish cough response tests is necessary to interpret the results, and therefore the technique has limited application as a general screening procedure. Chemical analysis for heavy metals in he sediments revealedthat the residual phase of the sediments contained the highest concentrations of most metals. PCB concentrations in the sediments ranged from 0. Chemical analysis of sediment inter- stitial water showed that many of the chemical species were probably associ- ated with very fine possibly colloidal particles in the water. The concentra- tions of many of the metals were much lower in filtered water samples com- pared to non-filtered samples. The concentrations of chemicals found in liquid phase elutriate water did not change greatly when prepared from an exposed sediment compared to sediment unexposed to air. Studies on determining the amounts of chemical species which would be released upon flushing the sediments with Lake Superior water showed that only about one percent or less of most of the chemical parameters COD, Fe, Mn, Ni, Pb, Cu, Zn, Hg was removed from the sediments by water extraction. These results indicated that the measured chemical species were not readily available to water except when associated with particulates. Although survival of test organisms was generally high during the hr toxicity tests, some correlations of survival of Daphnia magna in water overlying sediments tests with chemical parameters were found. Many of these correlations involved the con- centrations of metals in the sediment, in interstitial water removed from the sediment or in elutriate water formed by mixing sediment with Lake Superior water. Correlations were found between iron concentrations in inter- stitial water removed from the sedi- ments and Daphnia survival. On the basis of one or more chemical parameters, most of the sediment samples used in the bioassay tests would be classified as polluted according to the currently used sedi- ment evaluation criteria. Ranking the sediments according to their concentra- tions of a large number of metals, inorganic nonmetals and organic chemical parameters indicated that sites located in the Superior harbor near the Superior entry to Lake Superior and a Lake Superior site were less polluted than sites located near the more industrialized zones in the harbor. A general index of toxic effects, developed by considering the relative percentage of low survival for the various acute toxicity tests, showed that survival was generally lower in test systems derived from sediments in the industrialized areas of the harbor compared to the less developed areas and the Lake Superior site. A lower correlation coefficient was found be- tween rankings based on interstitial water chemistry and the percent low survival values. These results indicate that the combined chemical test for the sediments were a fair indicator of general toxicity. Further analysis of bioassay results and chemical characteristics of the sediments is desirable. If correlations hold for a wide variety of sediments, additional understanding of the causes of the observed toxicity results may be obtained. Com- pared to PCB levels in the dried sedi- ment samples, bioaccumulation factors of 11 to 18 times were found in the animal tissues. However, limited evidence suggested that the observed concentra- tions of mercury, cadmium and chrom- ium in chironomids were due to accumulation in tissues. Chromatograms of organic extracts from sediments, chironomids and Hexagenia limbata, using reverse phase high pressure liquid chromatography, showed the presence of organic com- pounds with high bioaccumulation potential; although no attempt was made to identify and quantitate chemi- cals. This method of screening samples for the amounts of bioaccumulated organic compounds is potentially useful. Screening of sediment extracts or extracts of animals exposed to sedi- ments using reverse phase high pressure liquid chromatography should be further investigated. In particular, the eluent fractions containing organic compounds with high lipid solubility should be studied for methods to quan- titate and perhaps identify highly bioaccumuable compounds. PB ; Cost: Environmental Research Laboratory U. Environmental Protection Agency Duluth.

Chapter 4 : Sediment bioassay research and development / - Biodiversity Heritage Library

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Chapter 5 : Research And Development (R&D)

Chronic sediment bioassay protocols developed in the USA are not appropriate for use in the UK,for a number of reasons www.nxgvision.comitivity,www.nxgvision.com yet,the UK (or indeed Europe) has no definitive protocol for a chronic sediment bioassay.

Chapter 6 : Research and Development (R&D) | Overview & Process

United States Environmental Protection Agency Environmental Research Laboratory Duluth MN Research and Development EPA/S June Project Summary Development of Bioassay Procedures for Defining Pollution of Harbor Sediments Donald A. Bahnick, William A. Swenson, Thomas P. Markee, Daniel J. Call, Craig A. Anderson, and R. Ted.

Chapter 7 : Sediment bioassay research and development / - CORE

Development of an approach to the assessment of sediment quality in Florida coastal waters. Prepared for the Florida Coastal Management Program, Florida Department of Environmental Regulation. MacDonald Environmental Services, Ltd., Ladysmith, British Columbia.