

TRANSCRIPT

INTERVIEWEE: **David Marrack** (DM)

INTERVIEWER: David Todd (DT)

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DT: My name is David Todd, I'm here for the Conservation History Association of Texas. It's October 22, 2003 and we're in Houston at the home of Dr. David Marrack who is a pathologist and general practitioner in the city and has been active in public health and environmental issues for many years here. I want to take this chance to thank him for participating.

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DM: Thank you.

DT: Dr. Marrack, I was wondering if you could tell us what your first exposure to—or you interest in protecting public health might have been.

DM: Well it goes back into, well 1936 (inaudible) was really one of the most—made a great impression on me—was the Croyden (really the Great Depression) typhoid epidemic. And my late father got involved in investigating it and we—well he was getting samples and growing the organism. And—but we were also plotting the cases and the distribution of the water and sewage systems and I was doing some of the graphics for this on the local net. And got interested in it and the—the problems and also the way we use logic to illustrate what was going on. And that was basically an—an eye opener in many ways. We were also, about that time involved with the gopher, if that's the word, in—on the London Underground. We were—my father and several others were involved in sampling how particular matter and gases distributed in the London Underground—it had been proposed that this was a safe place from poison gas, which was a threat by 1936 we knew a second world war was

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coming. And they proposed to use the underground as air raid shelters and one of the questions was what would a poison gas do. And so various organisms—(?) particularly was released at various points and then sampled and I was at various stations sampling to see what came through and it was very obvious that it was distributing very neatly around the underground system all over the place. So, that was an early start and then from there on there was problems in some local streams from the discharge from a large airbase that was developed east of Bishop Stawford is now the Stanford Airport and that had a—a real problem on a stream that we used to go down to to collect biological specimens and (?) flies and things, it was a nice little place. And it fouled up completely. And it's gone on from there. Of course a very big concern during the second world war of food supply and spread of infections and I was well aware of what was going on through my father and other

contacts and some of the work we did as a student—a student worker. It just continued there on out. When I came to the states, one of the early things...

DT: Maybe before you came to the states can you mention your experience in the London killer smog?

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DM: Oh, yes. I was working at the Rompost Graduate Medical School at that time. I lived about three miles away. You had to realize the fog was so thick that I couldn't see the front of my car. I drove along to work looking out of the window at the curb and nearly drove into a shop doing this. You—I had to make one of the turns, I had—I had to count up the lamppost—you couldn't see the light on top of the lamppost, but you could see the lamppost that you went by along the curb—and count them up and make the turn at that point. It was injurious enough to a—a healthy athlete. I was uncomfortable—chest tightness, running eyes, persistent headache and runny nose. I just felt sick. The only possible way to describe it of course—we didn't entirely understand why there was so many respiratory cases except obviously they were worse having the same problems I was and everyone else, just worse. The deaths that became so obvious that there was an epidemic going on and a problem—lost about three days or thereabouts—that the

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McMillan Government required that all deaths of respiratory disease be called influenza and so the apparent statistics are that there were only about four thousand deaths due to the smog. The real answer is about nearly ten thousand to twelve thousand in retrospect going back and looking at the mortality records from the various areas—areas. It wasn't instantly the—it's most notorious, but there was another one a few years earlier in the '42 period, which wasn't as devastating as that one and of course there was an earlier one back in the 1890's I think it was when cattle died at the Smith's Field Cattle Market. There was a major die-off of cattle brought in for sale. But those are all forgotten about and there is very little data available anyway. But...

DT: What were some of the sources of the smog? What do you think the policy effects were?

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DM: Oh, well two things. One, it was quite obvious that the smog was coming from the burning of coal—soft coal in the domestic fireplaces. Every house had two or three fireplaces to keep the house warm and this was late in the year and there were all smoking and belching smoke and then you got an inversion and the smoke had nowhere to go and it just accumulated. And of course all the industry—there was a lot of industry in—distributed through London burning things and making—and of course some motor vehicles, plenty of those too and trucks. And of course they're going slowly so they're making more than usual. And it just accumulated in a little blanket and until the blanket

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moved on we were stuck. It was—(?) at the time, I didn't have insight into what was happening expect that this stuff was poisonous obviously although I had no idea why, what the components were, no one was looking at it in chemical terms to analyze it and it just was assumed to be various mixture of obviously nitrogen oxides were there and what else, and particles. I mean the soot can be so heavy that you can hear it hit the paper—dropping down. I mean if you put a piece of paper down and it was soon covered with little bla—black specks and that was quite common in London, the—the soot was falling on your paper even in buildings with the windows closed. Yeah, it was a very miserable time and

obviously it did a lot of damage that was never accounted for.

DT: Did it lead to any policy changes?

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DM: (Inaudible), yes. That started off using—banning soft coal burning in domestic and other fireplaces and boilers. So we're going to anthracite hard coal with much less emissions in terms of fog and not so much nitrogen oxides but the particle stuff and the yellowness, which obviously was nitrogen oxides, was one of the things. Probably that was the major step that came immediately—arose very quickly. Not much else was—had been changed, but also the recognition that this was a human generated and therefore—ministry generated and that we needed to cut down the industries emissions in London area and the first steps were taken to do that too. But it—it's very difficult to realize, unless you go to Beijing or somewhere or Karkoff to see the kind of fog and the pollution that occurred at that time. Then I came to this country and it was—one of the earlier things was endangered species concerns—I'm—my hobby is bird watching and one of the birds out here that you used to be, was in the city limits in fact, was the Prairie Chicken and the—they were

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being exterminated basically because their—habitat loss and the effort was made with the Nature Conservancy and a—a small group of us to raise funds to buy the land out at Sealy and it's now the Prairie Chicken Wildlife Refuge. It was—it led into working with Armadela Montague who was a nature activist, a very knowledgeable in all sorts of aspects of the state in that time and a lady who's now Sharon Hackleman, I don't remember what her name was then. We were involved in raising money and—successfully, and bought the or helped buy place. It also led at that time to several other things. There was the Texas Water Plan, the first plan, which involved the proposal to divert water of the Mississippi River to West Texas, the Lubbock—the Lubbock area, or high planes. My recollection it was to be taken out of the Mississippi above Baton Rouge. We knew at that time it contained something in the order of ninety toxic chemicals—that water in the Mississippi and—(?) uphill, a big ditch, all the way to West Texas. And it

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was going, obviously, cut across the headwaters with a number of rivers, Trinity, and San Jacinto and others. This raised some real problems about the flows in those rivers and how you would cope with this situation. And of course not the least was the energy consumption to pump this amount of water uphill. And there were a few calculations so this was exuberant and there was no way you could pay for it. And then it became an issue should the public tax dollar of Texas be used to provide water to the farmers in the high plains and when it went to the vote and referendum it was turned down about three to one flatly. And it went dead for a number of years. This issue was—got resurrected another time maybe five or six years later and it went down in flames again two to three against it.

DT: And the defeat, was it mostly on economic, financial grounds, or was it on environmental grounds?

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DM: Well, in the public perception, they didn't want their dollars feeding, providing large incomes for farmers who were wasteful in West Texas. They were having problems with the water level in the Ogalala Reservoir. They were pumping it so fast that it was going down rapidly and it was obviously going to run out, and will run out, unless we do—change the way we're doing things now. And the people grasped the idea, a lot of people did, that

you shouldn't use such good water, clean water, from the aquifer to irrigate crops—the crops that needed a lot of water like alfalfa and that you should grow low water demand crops on those lands and save the water for domestic use, drinking only, in the cities. And there was a good deal of discussion then and it's gone on since of developing gray water distribution systems for non-consumption uses of water and having double water systems in houses. I mean it's a very good reason to do this. And at the same time there was a Chicago ongoing effort to pump the sewage from

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Chicago out to farms and fertilize the land. And so there was a whole diversity and concerns with water use and water management across Texas at that time. And this had social impact, or societal organizational impacts, that went along with Wallisville—Wallisville was also being proposed in the '60's to—and this was a plan by the industrial banks—industrial people, bankers and other entrepreneurs and speculators in Dallas to dig out a canal to build a port the size of Houston's port at that time, in Dallas using the Trinity River as a barge canal, canalizing it, destroying the habitat on both sides in a big way, making a 22,000 acre lake in Wallisville, just north of—actually both sides of I10 about eight foot deep and this raised some real serious issues that have never been entirely resolved. One of the points being that we got the fisherman and the—the—both the commercial and the recreational fishing organizations concerned because it recognized that the econon... the catch both sport and commercial in the—the Galveston Bay and the Gulf, depended upon the replication of the species, all of which for practical

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purposes required a period of growth in brackish waters, which was provided by the Trinity Bay. And in fact now, if you go and look up in the (?) channels of the Galveston Bay, there are lots of little animals, lots of little shrimp, lots of little fishes, up there in the low salt water where predators can't get at them and also an enormous amount of food supply that's brought down by the river. One of the fascinating aspects of why the Galveston Bay and Trinity Bay are so much more productive than the other Texas Bays and people forget that the in the 1800's the huge cattle drives to Fort Worth where cattle slaughter and the offal from those was dumped into the Trinity River. And of course this was a huge source of nitrogen, phosphorous, and potassium and it went down the river and fertilized it and I think it accumulated in the plants all along the banks and in the bay and it's part of the reason that Galveston Bay is so much more fertile than almost any other bay around anywhere. And there's an interesting study in one of the core documents showing now, or at least 20 years ago or 30 years ago, the gradient of nitrogen, phosphorous, and

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potassium in the Trinity River from above Fort Worth through Fort Worth and Dallas where—where riders are from the sewage affluent additions and then dropped in a nice slope all the way down to the bay. So in the sense the bay is continuing to be fed by the food that the Dallas and the Fort Worth people eat and put into their sewage system. It's a recycling system if you like of a kind. The dynamics of this is fascinating. Anyway, one of the problems that we all recognize, a lot of people recognize, that this was (?) going to be devastating to the economy of Galveston and the Galveston Bay and the Houston area. A big opposition was put up to this and basically went down in flames, but kept being resurrected. A lot of the problem was the huge Wallisville Dam and that was cut back to 5000 acres and much shallow about four feet and the trouble with that is that the (?) had

big fluctuations in its water level and the problem with that is the weeds would die and the water was for industrial uses and it was far too dirty to be used in any

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industrial places. So the industrial companies have got to do a major cleanup with this water before they can use it and it just didn't make any sense. The idea that you wanted to move barges up to Dallas just doesn't make too much sense. The other side of this is that the rice farmers were having problems with the Trinity River from which they were withdrawing irrigation water for their rice fields and if the salt water from the gulf and bay comes up into the Trinity River to the intakes, which were up north of Anahuac or by Liberty for the lowest ones. Then putting salt in the rice fields, the rice won't grow. A great deal of effort has been put in since then to grow rice which are more tolerant of the salt coming in—that has some success. But they were concerned about this with low flow levels and one of the—you get a ton of the dense salty water along the bottom of the river. Of course there were intakes at the bottom—near the bottom of the river too, so they picked up the salty water rather than the top less salty water. Well the obvious thing to do was to put a dam that was inflatable across the Trinity somewhere be—downstream

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of these intakes and blow it up when the tunnel of salt water, which you can monitor all the time, begins to move up and the flow and the Trinity goes down. And—in fact I proposed this to the corps and there was a hearing at the Anahuac High School back in one autumn about this time of the year. I'm not quite sure when, '74, '76 period, and in fact this proposal, I think Colonel Vanden Bosch was running the—the meeting and he certainly grasped the significance of this issue and ran with it and they upset the rest of the meeting of the hearing. The—and it wasn't new ideas, the corps had done this previously elsewhere, they already knew about it they just hadn't thought about applying it to this situation. At the same time the rice subsidies had run – the economics of growing rice was declining seriously and so the number of acres of rice field had gone down. This hazard biological side—aspects which I might mention at this point, is that the huge flocks of migratory duck and geese that come into the gulf coast for the winter depend upon those rice fields and the rice grains that escape being harvested when sprout for the food that provides the food supply in the winter. So building on the rice fields in West Harris County and

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elsewhere around, which is much of the plan around Houston in some people's minds, would destroy the hunting and the support of the wildlife. And of course there is an international treaty on protecting migratory wild—wildfowl, which would be implicated. The other side of this canal to Dallas was that the Outdoor Nature Club of Houston and the Audubon Society ornithology group particularly were concerned because it would destroy much of the bird habitat which we so enjoy—all the consequence of its presence we enjoyed. And some of us tried to persuade the board of directors that they take an active part in opposing this and they refused. There was a meeting, which Harvey Patton and I went to with the board of directors of the Outdoor Nature Club and they voted against us. There were several members, long deceased, who were adamant against it. It's interesting that Joe Heiser, who was aware of this, he was (?)—he had been the first secretary of the Outdoor Nature Club when it was founded, recognized the importance and tried to persuade people that we should take a political position, which we had never

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done before on the issue. In result, one of the consequences was that the Henry and Louise Hoffman, I think both are now dead, Harvey Patton, who I'm not sure what's happened to, myself, and Armand Yramategui initiated the idea that we needed another society that was politically active in this kind of environmental problem. And so this led to the Audubon Society or the National Audubon Society, was the obvious organization who we could insert ourselves into, that may be the right word...

DT: Could you back up this a little bit and help us understand why the board of directors of the Outdoor Nature Club and the Ornithology Group were reluctant to get involved in this issue?

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DM: I don't think I know what was in their minds but they were anti-political. We were bird watchers, we do archeology, we look at insects, I plan to identify, I'm not very good at it, of flowers and fungi—we're not going to touch this, this is political, we shouldn't be in with the politics.

DT: So they were interested in the biological connection but they just didn't like the controversy.

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DM: I'm not sure they understood all the damage it was going to do, some of them. I think they were blind to the concepts that the thing was changing and was going to change anyway and we need to have—put some management tools onto that change that was coming. I don't think they understood, for instance, the plans of [Walter] Mischer and (?) of West Harris County to build a huge city out there by Katy. That comes up again later. Anyway that was—so that led to the founding of the Houston Audubon Society and my recollection, the first meeting was in February of '72 but I may want to check that date—I—I got the notice of the original meeting upstairs amongst my archives. And from then on they steamed forward with Harvey Baton as the chairman and I was vice president for

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environmental affairs and they got active. I mean nationally the Houston Audubon Society, amongst all of the societies, was known as the most active and still known as one of the most environmentally active societies. I got all the core of applications to the Corp of Engineers for their projects that went through the 404, Clean Water Act and requirements and 402 sections and went through them meticulously every time and protested repeatedly. We went to court several time—went to hearings several times and won.

DT: These were proposals for dredging and filling?

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DM: Dredging and fill wetlands and very soon the core got to recognize that they were going to get absolutely nowhere with this. We were going to win hands down every time we protested. You were required to send a 60 day letter to warn them that you were going to take action and I was writing this Jim Blackburn sixty day letters very frequently and they got the idea, after two or three of these, that if we wrote a sixty day letter, it meant we had an impact on our side and we were going to win. And they backed off very substantially in the things they tried to permit. A particularly important one, which was a company, I'm not quite sure if it was a subsidiary of DOW or related to DOW down at

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Freeport, that wanted to fill a forty acre of marsh to build—wetlands—to build a plant and I protested vigorously over that. Howard Scarlet, who was in on the post-environmentally,

gave us an ex—excellent editorial comments on the situation and it never got very far. The core basically, and the DOW backed off. About that time, DOW was allowing—the Freeport count was going, Christmas count that is, and they didn't like—they wanted to get back at the Audubon Society. The Audubon Society was the organizer of the Freeport count of Victor Emanuel. And they threatened to deny us access to all their properties and we said yes do, we'll go public. And we have Howard Scarlet and others who will—or the Houston Sportsmen's Magazine was edited by A—Sarah Emmot and she was very much—she's another one who was very much against the Wallisville project and the dam—barge canal to Dallas and she adamantly opposed these in—inursions into the wetlands. And so we had the Sportsmen on our side too and we had a big enough group of—sources of publicity. We—the television stations and the radio stations were not much good to us, they were just simply dishonest or indifferent, whatever the word is, but expect for the station that—KPFT and at that time I had a...

DT: Pacifica.

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DM: Pacifica, thank you, thank you, that's what I'm looking for, Pacifica. I had a weekly environmental program on that and so we used that.

DT: What would you discuss on your program?

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DM: Any environmental thing I could—that came up, that was going around or could be brought up. And we had a women who's unfortunately dead, who sort of chaired that operation and then we brought in people to discuss things and as I said we had other persons other than myself and this was a fascinating, the call in—it was a call in program. We got all sorts of questions and—between us most of the time we could answer them and give a where to go to get the answers. It had quite a big audience apparently because I—I got asked questions by a colleague, professional colleagues about the issues that were raised on this in the morning—in the morning at about nine o'clock, ten o'clock, and I was very surprised in fact how wide a audience we acquired for this program and it was obviously educationally effective. And helped to sink the second Texas Water Plan and some proposals for a third one—excuse me—which never got anywhere. It changes the whole attitude in the—in the area and industry around that they couldn't get away

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with just anything. And that came up—I've forgotten which company was going to build a viable chloride plant down on the ship channel and a lady who lives out in Arizona now, with the League of Women Voters, very—single handedly caused a considerable disturbance with the automatic acceptance by the Texas air control board and the Water Commission of the plant (audible). Well, the—Andy Anderson had hosted the International (?) of Congress in '72 and Multoni from Italy had presented a paper on the—the health effects, particularly the cancer effects of vinyl chloride in the peculiar liver tumors that developed. They had evidence too of the other tumors in the brain and lung and leukemia that occurred. The—we used that and caused a certain amount of public education and education in Austin that (?) wasn't quite so innocent and wasn't an innocent business and they required some extra bits. Then, almost immediately after that, the Darwin Shamrock wanted to build one and I took on that one as a public health issue. And it caused substantial hearings. I had the data and although we didn't stop the building of this, we

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caused (?) and one of the things that happened in the period over these hearings was—was a six month period, three plants along the ship channel had—separately had released twenty thousand pounds of vinyl chloride into the atmosphere because of malfunction of equipment bumps and what have you. And no action was taken by the Texas Air Control Board and in fact there was no publicity. Howard Scarlet got a hold of one of them and made a little bit of it, but really nothing was done. So when I got the opportunity to appear before the Texas Air Control Board in Austin, I slated them and of course an absolute uproar in the meeting. They—the executive director, whose name escapes me, was absolutely furious and wanted a copy of all my notes and I told him to go to hell, he should use a proper stenographer to record the proceedings and I wouldn't give him anything. At the same time—also at the same time there was a meeting of industry and others, public health people, at the National Institute of Health on the title of "Should Vinyl Chloride be Revisited?" And I participated in that. And so we had that material. Another interesting thing that came out of that, there was a man whose name escapes me, I can see him perfectly well, who—well there are two people, Infancy—Dr. Infancy had done the

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epidemiology studies around the 3 or 4 vinyl chloride plants up along the great—the Great Lakes and shown increases in liver cancer and brain tumors in the local population. And at that meeting in the NIH, the industry claimed they were investigating this problem but they had no data. In a subsequent court suit against, I've forgotten which company involving vinyl chloride, in—in I think it was Louisville—the document was got. The—the—circulated by the American Chemical Council in which the producers of vinyl chloride agreed not to release or disclose, they had substantial information of this vinyl chloride producing—associated with liver—strange liver cancer—a unique liver cancer that was very recognizable and they suppressed it and that came out in court. And we

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had that data down here and we used it as part of the evidence that the vinyl chloride, the Texas Air Control Board had better do something about these releases of vinyl chloride. And as a result of that they required (?) to get back up compressors and back up generators so that the thing didn't go down and blow—and discharge huge quantities of vinyl chloride into the public. No one ever did any health studies, no one could be persuaded to do any health studies...

DT: Was it just the difficulty of designing...

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DM: I mean it may not have been a 100% perfect, but it could have done very well at it, but they didn't want the publicity that this would create. They didn't want to know the image—the damage that they were creating and the potential lawsuits, obviously, that were involved. Somewhere about that time too, there was an episode when the, what was then Stouffer sulfur recovery plant on Manchester Road just—just north of the upstream of the 610 bridge over the ship channel. That's that great, tall red and white chimney there. And they had one of the big—biggest sulfur recovery plants. It was built during the Second World War because of sulfur shortage to get the sulfur out of waste organic compounds from the industry, burn them, make sulfur dioxide, make sulfuric acid and sell it.

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And they had a manage—mismanaged it one night and this (?) of sulfur dioxide and there was a whole mass of injuries and people going to bed. Well it wasn't a whole mass, I mean

twenty or thirty people sick with it and others complaining. And there was a court suit in fact, which I was involved in as an expert witness, involving this. They—when they had to get a permit and for burning this—oh yeah, one of the burn—that's right—hazardous waste was sulfur, that was a problem. They had to get extra permit—a permit. Actually the plant, when you had a reasonable manager that was doing what he was supposed to do, was a very good one, it still is a very good one and I supported it, much to some people's surprise. It was an excellent way of destroying hazardous chemical compounds and getting recovery, they were recovering some of the energy and they were recovering the sulfur. And because the sulfur goes to such—was used to make sulfur

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oxide—made to use sulfuric acid, which had to be sold on the commercial market, they couldn't have it dirty. The specks for sulfuric acid are tight, so they had to run the plant very well and not let things get out of hand. Also if it went down, the system choked with condensed sulfur, so they had to run it under control, very well. There was a lot of economic pressure on the manager to do a very good job, and they do. And so I saw ever reason to use this. It—I was already interested in the problem of waste management in general, particularly that we already—I started to write a book, which (?) published, or a chapter in my book, on environmental health and I was doing the water issues. And very—what I wasn't aware of I think until I started doing it was the relationship between dirty water, public health, and waste management. I'm not into the sewage problem, which are microorganisms and things, but much more important was the leading of lead and mercury compounds from solid waste and other waste disposal systems and organic

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compounds into the water making toxic material—or being a toxic. And so I was interested in the water waste management problem. There's not point in saying you can't pollute the water, you've got to find some—something to do with the waste, an additional thing, with the landfill. The landfills leak badly. The Gulf Coast Waste Disposal Authority, which is down in Galveston, was interested in get—collect—keeping its business going and collecting hazardous waste and burning it. They—the man who ran it, the manager, was astute and informed and realized that they need to have good air pollution controls and good management and he did his best within the—available to the—the equipment available at the time. When the problems of the super-fund cited MACO or [Texas City] Y site, tested the fork of the 146 and 45 on the north side there, came up what to do with this stuff. It should be pointed out this site is, what about 11 acres and 22 feet deep, the water table is about five feet, so it's well below and has banks up, they—in it was some cans or drums, which were hauled off—part of this was vinyl—contained

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vinyl chloride, and some heavy metals. And they went (?) a huge puddle of styrene tars and the styrene tars contained on analysis about six percent, if I recall rightly, of volatile organic compounds and of all of those, over a third was vinyl chloride. So there was a continuous emissions of vinyl chloride from the top of this thing when the top was dry when it was covered with rainwater, then it didn't have them so much.

DT: (?)

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DM: Yeah, just evaporating off the top of the thing. And that—in fact there was quite a bit of benzene there too and in fact it was such that the analysis—one look at the analysis told me

never to go there down wind. So I would only visit the site from—when I could be upwind and look at it. It's a good place for rattlesnakes around there, or used to be. And there was a—on the west side of the site was a large group of trailer houses, homes, they were getting water from the ground at that point, no one had vandalized it, though for any inorganic compounds, they looked at some microbiology. And also there was the house to the north, near 146 where the Noverese family lived and it had been the fancy house of ill repute for Galveston. It had a very nice swimming pool among other things, a very nice site. And anyway, they—Gulf Coast Waste Disposal Authority wanted to pipe—warm up this starting tars and pipe it to its plant, and burn it, on site and I think it was an extremely good idea, a way of dealing with it. One of the problems was how you mine it. I would suggest that we put a (?) the whole thing or froze it. As you

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may know if mining, when you've got wet soils, you freeze it and then mine through the ice. And so one of the things to do was just to freeze this thing solid, mine it with bulldozers and the vapor would be stuck in the steel iron, it wouldn't be coming off very much and that would be alright. Eventually they used a sort of tent over it where they—an operating face and incinerated in a mobile incinerator which was less than satisfactory and was never tested properly. But that's a side issue. The site was soon shown that there was water contamination and the water was soon to flow south into Galveston Bay. When the hydraulics was done, it went north under—under that dyke that protects Texas City in uptown north somewhere. The—as soon as they recognized that this water was the aquifers down inside the 1360, a hundred feet were contaminated they—Galveston County quickly provided water supply to that small subdivision of trailer homes. If you go down there and just go north of the—the takeoff of 146 on the right hand side, you can still see a gate or two and there are concrete roads running in and you walk down there, chose a cool day because the rattlesnakes are still there. And they

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were provided with pipe water from Galveston, surprisingly rapidly. The Noverese family didn't get it and their daughter married and got pregnant and lived at the house and she had a child with severe spinabifida. And they sued and Jamales got a group, took it with Mary Atkins, was the active attorney and I worked with him as an expert witness on this case. We found an extra well that no one knew about apparently to be the cattle water supply well and sampled that and that contained quite a lot of toxic materials—biochloride, benzene and other things, trichloroethylene. And eventually the principle party paid for its cleanup, which I think was Monsanto. And they were monitoring wells around and they're being sampled now and I'm told they are—the figures are that it's pretty clean. That was a very interesting, long drawn-out effort to go through all the processes of public hearings and agreement on what to do with this site. And it led on very quickly to the Brio site from the north, which was very similar in many respects. There were open pools of water when I first saw it, there were dead animals and birds around that had drunk the water and were poisoned and died on the site. The subdivision was built so that the backyards were up against the north fence of the industrial site, dump site. There had

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been a series of companies that had thought they would recover material from the styrene tars and what have you, unsuccessfully and went bankrupt. There was a school just to the north and east of the site and the road beginning "B" that runs on the east side. The

subdivision I was asked to examine the child—the families and children of the subdivision. I saw about a hundred families and more than a hundred children in my office. Most of them hadn't much to show for it. I inspected the site several times personally. You could find tarry oozes coming out of the drainage ditch on the west side and they were leaking through in little patches of black and brown coming through of tars. And the cap was put over the thing to close off the—(?) cap to close off the accumulated water there and a good fence was put all around. However, the tar—the tars didn't respect the fence and were in the backyards of various places where the children played. And, but you sued the homebuilders, the homebuilders sued the site developers who put in the drains and the roads and what have you. And there was in fact recovery for the homebuilders to some extent and to the homeowners. We got them basically paid for their home, their moving and some medical expenses and some spare cash too out of that case—I don't think they

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got all they might have done, but anyway they did. In doing this, I looked at several families who were particularly interesting. There was one child where, about a year old, that was getting rashes every time they washed the child. When they went to the grandmothers up in Liberty or somewhere they—the rash went away in two or three days and no problem. They come back and they wash it in the water in the house—excuse me—and within hours, a bright rash reappeared and itching. It was very clear, (?) several times demonstration. There was something in the water that caused rash. There were a number of—there were only two adults who had some rash and there were two other children who had rashes very similar, fine, red rashes. And we never did discover what the chemical that induced this rash. There wasn't exactly the most persistent effort

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to find out. There were a number of—there were so many chemicals in there one would never had known I think without doing a real very exhaustive investigation and no one wants to finance that and find out. Eventually the waste was burnt and, again with an incinerator that was less than I think adequate—neither current technology at that time. But it did take—one of the things that both the Gulf Coast Waste Authority and the Brio and this and some other waste sites got me interested in incineration processes and I suppose quite possibly my science and mathematical background of physical chemistry. I think I claimed to understand a good deal more about burning the process combustion than most people do combustion engineering. And this led in fact to—I wrote—gave some papers at the Airways Management Association on this and...

DT: I'm sorry (train sound in background).

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DM: The suit was successfully prosecuted with the Jamail group and provided me some interesting contacts into the legal group. The whole process of being an expert witness or acting as a attorney pro se in these issues and hearings was (?) educational. I had the good fortune of course to have Jim Blackburn and Rick Lowerre as friends who helped me a great deal in guiding me in what to say and what to write and what to do to put things together and the formats to use. And this was a steep education (?), I'll tell you that. (Laughing). But it was—it was fun in a sense and very interesting because you got expert witnesses who, from the other side, who really didn't do their homework, or had never done their homework. And so you could get attorney—there was an attorney Al Green who was vociferous and aggressive and others, which were really quite good at bringing down the

problems that the expert witnesses of the industry brought in that had (?) of their educational material that they had. This policy—the Marquade, really was a very
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important one from the people in the area. So in terms of public health, this was a major issue and the (?) really did nothing about it, they weren't interested. It led on rapidly to the issue of the proposed solid waste, municipal solid waste site on the southwest side of Katy-Hockley Road and south of—mainly, entirely south of Cypress Creek right into the flood plain. They were going to build this thing. There were two big issues. One is, the proposed height of the berm around it wasn't high enough. The Possum Kingdom Storm of '32, water from Cypress Creek had spread and flowed over land, surface flow, all the way down to White Oak by Buffalo Bayou, Brays Bayou to Clear Creek, right across, a sheet of water going—moving south. And their berms weren't high enough to stop that, so they were going to be over-topped. The other side of that was this land is not stable. There is the great salt dome at—south of Warren Ranch there and this is a big salt dome, if I know it's big by how big they go, but this is, according to Dr. Clark at Rice that was one of the experts testifying in this, it's about sixty thousand feet deep and three miles—two to
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three miles across, a great big pear shaped thing. And it's been heavily studied by the oil exploring people for testing their instruments. So a great deal was known about its geology. And it's active, there were series of fault sites all around there that are still active. As a matter of fact, as you go out to 90 and go across, just northeast of Fairfield where you got that steep bit of slope there. When I first came I thought that was a bench, in other words, an old sea—seashore shelf—I thought that that was a fault—I thought oh, that's a fault line. And the Gulf Coast to the south and east is slowly sinking into the Gulf Bay very slowly but shimmering all the time and going. And of course we have the long white fault which opens up around again. And you can see the fault on the 290. Every now the tarmac has to be repaired where it splits. And you can track—feel it as you go over the pump now. Anyway, one of the things that came out of this was the—the little creek that runs into Clear Creek to the west of Katy-Hockley Road and if you go and look at it carefully around again, there's streaks of oil running down it—little shimmers
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coming out, oozing from the oil that's around the salt dome, the interface of the salt and the water. And then Clark found maps that were made of the West Harris County. My recollection is was something like six-inch contour in the 1900's part of the rice field's surveys. And there appeared on these, or are now known to be, present now, some small shallow pools of water. And he went out and looked at these and one there were obviously subsidiaries that are not on these maps. So they didn't exist at the time that the maps were made. Secondly, they've got sour water in them with the emissions from the oil and the sulfur etcetera. So they knew and so we had evidence of an active geology in the region around this. And I was in it as vice president of the Audubon Society of Environmental Affairs because that set of woods along either side—north and south—east and west (inaudible). Along the bayou—along the stream there, the creek, is—was a major roosting site for the endangered southern bald eagle and that's where they come in the winter and roost there. They don't do it so much now as they did then. And we
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were—we had fortunately eagle counts annually made in February for the area and so we

used that data to—as part of the data to show that the area had an endangered species impact too. It was also very interesting because I was acting as an attorney for the Audubon Society and distinguished geologists from U of H had done resistance measurements across various bits and said there weren't any faults. And he hadn't made the measurements at the same time, they'd been spread over several months. And what he didn't know is that I helped designed the electronics of that instrument years ago. I designed galvanometers at one time to get more sensitive ones. So I was able to cross-examine him to show that his mechanisms for measuring were so unstable and he didn't calibrate them before he used them each time. There's no way you could translate the data from one time to another and it caused a great deal of confusion. It was fun. The whole issue of public health in this area, I didn't bring it up. But back in the Airway Management Association meeting in '72 hear in Houston, Dr—I know it perfectly well – gave a paper. He had studied the

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absence from school of school children using the attendance records and the then available air quality data which was basically (inaudible) total particulates and ozone and showed that when the pollution approached the upper limit for both of the—either of these or both of them, the absence from school went up substantially. And Jenkins—Dr—Dr. Jenkins who was head of the Baylor epidemiology—respiratory diseases division at that time, he's retired—this didn't catch on locally, but it caught on elsewhere and it was used by—the technology was used by the people to show elsewhere that the same thing was going on. But the local community, it was I think reported by Harold Scarlet in a paragraph, but basically no one recognized, or was waiting to recognize, what was going on. There were other proposed efforts in doing some tried to (?) investigate the cancer problem in the area. Discreetly, politely, I was told don't. It was not good for your health and your job. It was very apparent to I think all of us that Emil Fry who was then the head of the chemotherapy and the MD Anderson and others were all recognized that investigating the cause—the chemical causes of cancer was not an appropriate activity in this area because the money came from—a great deal of the of them brought money to hospitals and research came from the petrochemical industry and their associates. And of course, at that time, it was something like over a third of the funding of the School of Public Health hear in Houston was coming from industry who clearly

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would not be funding it if it was used to show that their activities were releasing toxic chemicals into the atmosphere and water, which was poisoning people and causing sickness. So it was a steady embargo on doing that kind of research anywhere in the medical sense and around it except for (?) the MacDonald's and Dr. Jenkins and then—oh actually a Legator—Dr. Legator did some studies down in Texas City, but it just wasn't a good thing to do, so we didn't.

DT: And this...

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DM: We couldn't get from any of the clinics in the hospitals the data on the number of children coming with asthma. The—some medical records had said well that raises legal problems and identity problems and all sorts of things like that, we don't need any of that. We said we don't need the identity, we just need the numbers. You know, they're all coded on (?) what's the problem. Every conceivable plot and no one ever got any decent data.

Even the Baylor people in their own clinics, weren't able to get decent data together. It quite obviously went up.

DT: And the kind of data that you were looking for was...

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DM: (Inaudible) attendance for asthma was what I had in mind would be the obvious thing to do, which obviously went up. And it was a—one of the problems is the whole of the asthma problem children is not expressed in the medical records of hospitals and clinics because a lot of patients go to private doctors, pay cash, and get treated and that's it and there's no record anywhere of their existence.

DT: No insurance record I suppose?

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DM: No. There are in the—in the doctor's office maybe, but nowhere else. And the—so you can't get good statistics anyway, but it would be interesting to see how many people come in. And again, you've got mothers who are knowledgeable, just increase the dose when the child gets a liver problem and no one sees that. So one of the sessions I had a long time ago was to document the purchases of Asper and decongestant medicines from pharmacies cause they've got it all in the computer and you can see—well I collected up some data on this and it does show when the air pollution goes up the sales go up. The whole problems, you know, back in the late '60's and particularly the '70's created lots of problems in terms of dividing people and—serious—serious, aggressive behavior potentially. There was a great hearing that Cheryl Stewart can tell you about on ocean dumping and the chemical—the companies wanted to dump really very hazardous chemicals out to sea and I testified in that—the risk it rose—created and why it shouldn't be done and it wasn't done.

DT: And what did you say?

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DM: Well, basically that these things—they were—they admitted that it was too toxic a material to—to handle on land so you could just dump in openly in the sea. And it all sort of vanished and disappears and it was a great (?) when never see again and that isn't the way the sea works. Currents. The fish and aquatic organisms will bring it up and bring it to the surface. I mean this is—you see this and then the problems at Lavaca Bay currently still with the lead and mercury that came from the Arcola plants until the clean air—Clean Water Act in 1972 when a Texas attorney, whose name, I can see him, who became legal advisor to the Audubon Society and the vice president. He was set—sued Arcola for the state to reduce the emissions. But every time you stir up the mud in the bottom of that re-doing the channel, you increase the mercury and the lead in the shellfish and still areas of that bay are still closed as I understand it to fishing, to eating the fish

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because of the pollution persists in the sediments. And the benthic or—organisms keep recycling in and amongst themselves and particularly the mercury becomes dimethyl mercury, which is a—really a very nasty poison—much more poisonous than mercury as such—a neurological poison. And it's not (?) in waters it's going up—coming off the surface the whole time too. (Inaudible) the other way from the air in and we have data on, for instance, the pollution of lakes or impalements that are cooling ponds for cold-fired power plants and their fish contain a lot more mercury than—and selenium which are in coal, than do the cooling impalements for oil (?) utility generating plants and they are still higher than natural occurring waters, a nice step gradient depending on what fuel is used in the

power plant. And of course this is being studied in the Great Lakes and demonstrated very clearly that about a third of the Great Lakes pollution comes from the air.

DT: Well you said that...

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DM: Going to these hearings, I have been intimidated—or attempt intimidation a number of times by rednecks and others, threatening remarks, threaten my car. I usually make a point of going someone else with me in the car when I'm going to the meeting that would be beside me all the time when we were not in the meeting and again I usually got a—had a car behind me on the—on the road so that there was a second vehicle involved at witness and it was very obvious that we were going together and made a point of—being known that there were at least four of us there, not just a single—single driver in a car. And, you know, one learned from that good lady, Karen, whatever her name was in the plutonium cart...

DT: Karen Silkwood?

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DM: Silkwood, that's right, thank you. Yeah, I mean this is a very risky thing to be doing. These people are—think it's life and death for them to be—to clean up. And so there are some very extreme views out there. I had to be very careful to keep my—make sure that my identity and involvement in environmental things was not known when I did physicals for the large petrochemical plants employees that it was not known, the other side of my life was not part of the—recognized in the plot.

DT: Did you feel like you could be blackballed?

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DM: Oh well that would have been—they would have liked to have done that—(?) being physical. I think it would have been a physical attack or burned my car or blown it up or whatever else.

DT: Can you give us some examples of cases that worried you most?

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DM: None of them really worried me, I felt very capable of dealing with it. So we got things organized and I felt capable of dealing with almost any situation that was likely to arise. I mean obviously if we had a—someone set a fire—fire to a car or blew it up, we've got a problem, but just ordinary physical, verbal and physical abuse was not likely to be really serious effects. I could take care of myself pretty well.

DT: What were the kind of threats that you often...

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DM: You know, anything from 'we'll get ya' to 'you go in there and testify, you'll come out mashed' etc. and all sorts of things.

DT: And these people were mostly employees or...

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DM: I think they were employees or thugs employed brought in by the companies to try and intimidate witnesses.

DT: Did you often have any work or support for unions on behalf of what you were trying to do?

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DM: In the vinyl chloride business, Darman Shamrock, unions weren't against it but they weren't too—they—they got—split position because on one side they—it represents jobs

and employment for their—and size of their union, and the second side is of course the cost—health costs to their workers. And they are split. And we have this ongoing. Among them Houston Port Authority or the bay port is claiming this is jobs—well when you look at it isn't that many jobs. And what's more, it wouldn't make any difference which port—which specific locations, Spillman Islands or Freeport or the goods were important, there would still be jobs. The jobs are created by the goods coming in, not the location. And so putting it in the bay port doesn't particularly any beneficial to getting jobs. That you may need some more container-handling facilities somewhere, yes, and that will create jobs. DT: Since you've mentioned Bay Port, can you help us understand the whole controversy over Bay Port?

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DM: Well it's—probably the—the right kind of project—I mean there's been talk for an additional port facilities along the coast—upper Gulf Coast somewhere or another. The container ship business is obviously the way things are going to be moved around the world. So they needed the special facilities that—efficiently moving containers. There's some real problems with the Bay Port, but apart from the destruction of important wetlands that's involved, increasing the depth of the ship channel, we have a long investigation of deeper ship channel some years ago and it got down to 45 feet. That's one of the—part of the business of the—we (?) earlier about the salt intrusion of the (?), the deeper the channel, the more salt that will come in the upper bay, the more salty it will get and the more difficult it will be for the shrimp and the other fish who depend upon the salinity gradient to find their way out to the gulf or come in. I mean that has driven and if the salt's concentrations don't change, they've got no guidance which way to go, they get confused. Also it damages the oysters because the—there are oyster

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parasites that are destroyed by high fresh water inflows and there are oyster parasites that are destroyed by high salinity situations. So they need a balance in between and in fact they need a fluctuation to occur regularly to kill off the various kinds of parasites. And that's—so the deepening of the channel was a—a very important issue and it will also probably change the circulation pattern in the bay, which is a crucial issue too. And then, on top of that, is the emissions, air emissions from the—somewhere around 7000 diesel trucks coming and going everyday and they've got late trains, big trains with loads of stuff going through, going right through the middle of properties. Now, there is good data that every used highway have a health impact stretching out about 500 meters on either side. Of course it depends on which way the wind's blowing somewhat. But I gave a paper last year and I've got one to give this year in June at the Air Waste Management Association on this problem of a significant ignored health—adverse health impact from transportation and—particularly the diesel. But it's not entirely diesel, cars are not innocent by any manner or means. But it is an issue that needs to be addressed and we need to reduce this in terms of the public health. It's been to my attention that the standards for particular—fine particular (inaudible) are such they will have no—applying

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them religiously will have no effect on the public health basically because the problem lies in the five minute and the ten minute exposures that you get sitting at the bus stop by a traffic lights from a big puff of diesel emissions, or bus. And of course there's the data and the problem that's being investigated of the diesel school busses and the evidence that the

in-cabin concentrations of toxic (?) particulates is 3 times higher than the ambient air outside. It's not innocent to send your children by diesel driven school bus to school or to drive it to school in your SUV—they also have a high concentration inside. If you go on the freeway with your car, you are exposing yourself significantly to toxic chemicals, both fine particulates, BM 2.5 and the—things like benzene and formaldehyde, which are coming out of the exhaust. And there's some real problems with measures to control this in diesel at least, which (?) know about because some of the control systems increase the amount of formaldehyde you get don't help. It's a complex—extremely complex situation of fuel, engine design, and control—computer control. And I don't think we have it solved.

DT: And the diesel truck issue is just one of the aspects to the Bay Port complex problem?
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DM: Well yes that and then of course the—the—not only the trucks, but all the heavy equipment there belching away at—and the subdivisions around it. So they're going to get exposed and then those along the so-called San Jacinto Rail Line, again there's another problem coming up—un—unaccounted, undocumented public health—adverse public health effects. And so there's lots of reasons for not doing this type of operation in the middle of a residential area, and—particularly when there are alternatives and the law requires that you use the least adverse impact alternative and that obviously is problem Spellman Island or one of the other (?) Island down in Galveston Bay. And that has great advantages because the—there's already a fifty foot channel up to Texas City, so that's there. The site is not in the middle of a residential area. And the shorter distance to the gulf means the cost to the shipper of his vehicle go—his ship going an extra fifteen miles in land, slowly, is a significant cost in—in accumulated over multiple ships. So if you can do it on a much shorter journey into—to the port from the gulf, you're better off.

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And of course that was one of the reasons for proposing this years ago. The offshore oil terminal there off Freeport. Again the—the tank of ships—one you didn't need to do any dig—dig a deep channel, two could unload their oil cargo to a platform off in the gulf and then pipe it in land and that would reduce the time and cost to the shipper of the oil, the vessel being at sea. And the quicker you turn around the better you do. And so that was one of the basis of that proposal. Also, of course, it was part of the proposal—similar proposal was down at Palacios to build a liquid, natural gas terminal, a huge one, from Gas—compressed natural gas in Algeria. The problem with this, digging up part of Lavaca Bay where I mentioned the lead and the mercury down there, but also liquid natural gas is not a nice stuff. When, and as we saw out at—was it, not Brenham where it was, that escaped from a salt dome that spread down on a cold day along the ditches and then blew up. And that's exactly what natural gas does. It's cold, it's dense, it spreads with a film out over the ground and then it eventually reach—somewhere along the line,

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it gets a detonating mixture and it gets spark and fire it and the whole lot and a wonderful (inaudible). And I have seen something like that when a large gas, a coal gas storage tank in east London was hit by a bomb back in '60—I mean '50—no, back '40—'43 probably and happened to be about a quarter of a mile away. I saw this thing go up, I ducked, I didn't prevent my face from being burnt. Yeah, it's—I was in a trench watching and just—just a tremendous flare. And what we didn't realize there was a delay between being hit and the whole thing burning so the—spread out before it burned because you've got to get enough

oxygen air mix in. And then of course it (?). This—(coughing)—liquid natural gas has got some real risky handling problems, you don't want it anywhere near people. So that was not addressed in the—by the company that was proposing and recognizing—I mean—there was a major public civilian injury episode, I think in Algeria, when the stuff leaked from a tank and down, down into the village along the slope and then blew up. It's a real risky problem. The—so anyway,

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we—we fought that and successfully won that situation too, that was never built and that won't be built I don't think. Yeah, the problems of the public health, now I mean still, is the general inhibition of the process and you've got somewhere this article that was—came out by Natural Resources Offense Council, they call itself. (Inaudible) an (?) poisoning in Texas that was an interesting article too. It's, (inaudible) pointing out the problems as a situation not to be too friendly to. Being the kind of research that needs to be done and some people at Baylor are trying this now, I don't know how successful they'll be.

DT: Is this called the silent treatment?

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DM: Yeah, (inaudible), yeah silent treatment. Thank you. I think it represents a significant social moral issue for the area. It's interesting they never manage to get the churches and the religious groups to take up this issue in any way—a hands off, much I think for the same reason the—the academic community has been hands off as the economic issues for their particular activities and the source of their funds. And offices of the petrochemical companies are not going to fund out of their pocket research, which is considered to do damage to their interest in issues. And so it's began to be a continuing problem in this area and it's a whole problem of the funding of political campaigns, particularly in this area. Industry holds, carries the lead, and can pull them rather effectively. I mean it goes to the problems of the transportation. There are the subdivision developers who see West Harris County as a major urban area. They don't recognize, or don't wish to recognize the flooding problem that would create downstream

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in Houston. They don't recognize the problems of air pollution that's going to create for everyone around because the transportation, they've got to get to work. And we don't have a transport system. And until we get a—an efficient mobility system for the public, we've got a problem. I mean I find it un—unreasonable. There should be a capitol investment in busses for schools and they don't use them for the public too. The public transport system should provide transport to the schools and transport for the public. Daddy and mommy go to work and the child goes to school and the same bus system can take both. And we need to use low emission transport sources to do this and of course Chicago is trying the hydrogen bus. It obviously isn't going to come tomorrow. In the meantime you've got to do something with the diesels that are poisoning us. And I think that society needs to address this kind of pollution, because I don't think we're going to see the big change in the public health issue, which is the only reason we're doing anything until we address these issues. The ozone is certainly not good for, certainly not

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the levels we've had in the last few days, but on the other hand, it's not the only poison out there. The benzene is a good one and of course Dr. Killian at—who is the chief of the medical services at DOW did some very interesting studies on animals and showed the leukemia

effect in animals. His publications were suppressed for sometime and some of its been published since. He graciously showed me the data. He was on the Texas Air Control Board at one time as a medical personnel and he showed me privately the data. It's pretty convincing. It isn't—it really isn't new because back in the middle '30's, I well remember my—we used to use benzene at home. We had a bottle of it in the cupboard in the sink and we used it to get the tar spots and oil spots off clothing and paint off things and we used it pretty freely. And I remember one of—an evening my father came home and said, let's get rid of the benzene and proceeded to take the bottle and put it into someone's gas tank out—we didn't have a car at those days, but our neighbor did and we put the benzene in his gas tank and that was the last benzene we had in the house. And from there on, we were much more circumspect about solvents that got around—into the house or even that we exposed ourselves to, recognizing that these are—represent serious health problems.

DT: Well tell me when you've spoken to the industry figures that promote the plants and facilities that might be polluting this area and you say that the health effects, which you and your neighbors and they themselves are viable to suffer, what is their response? I mean they're not immune to these...

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DM: They're not interested. They don't think it's—you know, it's like not putting on—fixing your seatbelt and not getting immunized against influenza. There's a serious dichotomy, which we are in a schism between statistical realities, if you believe they're realities, and the perception and actions of people. I mean, you know, why—after 9-1, people, well I wouldn't go on a plane, it's too dangerous, but they get on a freeway with a—without thinking. The freeway is much, you know, ten times more dangerous than any plane has ever been. You know, though 9-11 was a great tragedy. We just have to recognize that the total number of people killed in that was only two months road kill on

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the highways in the United States and about a third of that is avoidable because it's due to drunks. And the Swedes showed us how to get rid of drunks on the road. It works, it's doable. We have a real deficiency in the way we react to figures and it goes for influenza immunization versus a fuss over SARS and Nile Virus. They're not seen in the same—part of the same statistical process. It's worrisome. There's lots of this around I mean there are areas in Houston where benzene concentrations go above 10 pbb, where they ought to be .5 as a maximum. And so (?) transfer terminals, it's near 20 or 30. And that's a dreadful situation.

DT: Do you think that the exposures vary with the poverty or the ethnic makeup?

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DM: Oh yeah, well that's of course one of the things I didn't bring up about the Bay Port and the rail line that's going to—supposed to be going to support it—is the report by the transportation highway—the transportation board, completely had antique data on the distribution of minorities around the site. When the current census data was used, it was a huge minorities all along the sides. My recollection, there were 20,000 school children within a quarter of a mile of that road—proposed rail route. And some of those schools were right up against a major highway too. And you have (?) example of the Chavez School, which is sitting right against a major highway, so the air pollution. There's a (?) petrochemical plant on one side, (?) site within a mile. No one in his right mind would put a—a school there. In California there's a commission, a board, which reviews all proposed

educational sites for their environmental suitability. We need that here, everyone needs that, where there's any industry around.

DT: Well do you think there's a different general attitude about business and environmental effects in Texas than in other...

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DM: Oh yes. If it smells bad, that's money basically. And the--the fact that it's costing a little-- Bob brought out in the Sonoma Report that was commissioned by the--the city of Houston on the costs and health effects of air pollution that was above the national standard in the AQS. And it showed that air pollution that's above the standards was costing us about three billion a year in dollars. It also is costing something between three hundred and four hundred lives. And of course everyone says in the paper, it's all the elderly that's about to die the next day anyway--it isn't. The average loss of expected life with each death was five years. It's significant. Of course part of that is children that die of respiratory problems, it isn't only cancers and all the other things. And it may be much higher than that because the statistics were very conservative to put it mildly and so it may be double that quite easily.

DT: In your clinical practice, do you have any sort of anecdotal experience (inaudible).

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DM: Yes, the brighter side (?) wonderful one. I had a patient, a woman, who I had seen two or three times and one early summer afternoon, I got a phone call from this woman and she said she didn't like tr--troubling me on Sunday afternoon, but she wondered what she should do. Her husband had come out in a bright red rash and I had seen her within a week or so (?). And she said it's itching and it's burning and it's terrible. So, I--I think we got him some--I assumed it was an allergic reaction to something, but I had no idea what. And I said well, it must have been Sunday afternoon, I said you better bring him into me first thing Monday--Monday morning, I'll see, I'll meet you here and find a hole and get him in immediately. And I probably gave him some--I brought him some Benadryl and I think I gave him some steroids to take too. And I saw him and he obviously had been wearing a muscle shirt, or whatever you call those things, with deep arm holes and the front around the arm hole in front of his arms and part of his chest

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which showed was the color of that red band of yours there, a brilliant red, itching and dreadful, in spite of putting Calamine on it and taking steroids. I looked at this and obviously it was a reaction to something and it hit him from in front. I said where did you--what paint did you spray on Thursday or Friday? I haven't sprayed any paint, I haven't used any paint. Well what have you been doing to yourself over the last--since Thursday, where have you been? I said what's your job. Oh I'm a landscape gardener. What's pesticides or--or herbicides have you been spraying? I haven't, all I do is mow lawns, or mow grass. So I looked at him and I said well. Now it had been raining on Friday and I said well you mowed Friday, did you on Thursday? And he said yes. Where did you mow? Oh, I was off--a road off Dixie Farm Road. Well I said where exactly? And he said there was a turning that goes up north from there, and its name I've forgotten, and I said oh yes. And what was on the side of the road? Well on one side he says a high chain-linked fence, which says, "Do not enter," or something or other. And I-

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-in fact I mowed the--one side of the--of the street, the divider in the middle, and then I went down the fence line. And the grass was wet and it sprayed up and that's all I did on Friday

was mow down in that area. This was a brio site and he mowed along the east fence of the brio site, the spray had come up and where it hit him, he got this red rash I had seen in the children earlier in the Southbend sub-division. So, I put him in the hospital right there and then and treated him for two or three days. It subsided, went home, but it reoccurred and I had to readmit him for intravenous treatment to get it under control and his skin sort of- eventually sort of flaked off where the rash had been. A rather typical, severe, allergic reaction. I had no idea what chemical. I have a suspicion that it's a thing called Trichloroethnyl, which is known to be a very potent chemical for producing allergic reactions. It's made- the only place it's made was in the ship channel and it of course (?). It probably got to the brio site or brio site and it was in there. That
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same chemical was responsible for this extraordinary episode over in Deer Park where a number of people got severe rashes including children. She had dreadful, I saw- I brought her down to the office and saw her and she had all sorts of ulcer up in her nose and around the face. It really was a miserable sight. She would- she- the family moved her out of town and she recovered in about three weeks. The states investigated the soil in the area and found nothing and did some other studies on leaves and what have you and found nothing. Some of the sample was sent to a lab in Florida and a diligent pH recognized a funny little peak on his gas- Mass Spectrogram whose identity he didn't know. And- but it was there on multiple occasions and it wasn't there on the blanks. And they said well that- whatever that is, it could be interesting. They eventually pinned it down that this was dichloroethyl and it's blown from the pla- the plants on the- one side of the ship channel, across to the other side, and this girls rash problems exacerbated severely when the wind was in the right direction from the plant.
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We then found that several workers in the plant had had a problem too, but they quietly got them moved off elsewhere and no- no mention was ever made in the reports by the plants to anyone and it was never brought up to OSHA or anywhere else. They just quietly paid off and went somewhere else.

DT: Did you ever see any more acute and long-term problems, neurological problems or carcinogenic problems that might have been environmental?

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DM: Well there could have been, well of course the- it was a problem with- down at the vinyl chloride at Texas City. The plant down there, Lefington and Whiteswyler did an epidemiological study down there on brain tumors. This arose because a student- I was teaching public health at Galveston, and one of the students came up and told me that his uncle, or whoever it was, had a brain tumor and he had met his friend in the hospital and his relative, father or something, had a brain tumor of similar kind. And he said he thought it- there was another one around like this and he wondered whether there was any connection. So, I said well that could be, as a nice little research project for you, go to the medical records and see and look at the brain tumor records. Sure enough he came up with 16 or 17 cases and when we did a bit more research, there were twenty cases I think. It's the largest cohort of brain tumors and they- that paper they wrote blamed it on probably vinyl chloride, but they tried- couldn't pin it down to the Texas City Plant
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because a number of cases that had not worked in the- in the plant- in the vinyl chloride

plant. Well they didn't know, or willing to know, that Infantus study on vinyl chloride up on the Great Lakes, when it was re-examined, it turned out that two of the controls that had this strange liver tumor had—one lived, a fence line from one of the plants, and the other one had worked in the plant has something that wasn't connected with the vinyl chloride unit within the plant, but their job required them to go there and take papers, frogs or something or other there, or collect them, and they were going in and out of the place. So really two of the so-called controls were cases and it completely changed the statistics because the numbers were very small anyway. And I was aware of this and I said well, you know, the first this to do is look for the other sources of vinyl chloride and I was aware of one, the—the (?) site and it turned out there was another one. So we have three vinyl chloride sites and that completely threw out their statistics and analysis. What none of us knew at that time was that the (inaudible) in animals is clearly a brain tumor

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generator. And the original study had been done in England using rats and there was no evidence that they produced brain tumors in the rats. When the same study was done by—in the United States, were using mice and several strains of mice, it rapidly—the thing was supposed to go for 120 weeks. By 60 weeks they had lost a third of their mice to brain tumors. It became the obvious at this point that butadiene was a brain tumor inducing agent. And in the '60's and '70's, when you drove to Galveston down 45, you knew when you were getting to Texas, you could just smell the butadiene, it was very easy—it's got a pretty strong-potent smell. And you were obviously going through high concentration, or significant concentrations. That isn't true today, or very rarely, but obviously butadiene was ex-exposition everyone in the area and so we had another source of brain tumors that was not known to the epidemiologists when they looked at the Texas City Plant they made complete nonsense of any epidemiology studies and some statistics. But they did find that there were

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eight times more brain tumors in Galveston County than there ought to be in terms of general population and other—and other urban areas—not so urban areas. It was very clearly a problem and the public health authorities never got really interested in it and the Petrochemical companies got concerned about their loss of product escaping from valves and wherever else and of course have cleaned up since then. Then the measurements of the Texas Air Control Board and the—and the Environmental Quality subsequent organization required them to cut down on these emissions.

DT: I guess a lot of these emissions we've been talking about are industrial and they're by-products of processes that produce other products, but I understand you've studied a lot of incinerators that are purely built to destroy medical waste and other kinds of waste. Could you talk about some of those?

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DM: Yeah, medical waste incinerators were a particular field in which I obviously had an interest because there are a lot of little pot burners and miniscule—two or three—six foot long, four foot diameter creatures that were filled up with the waste from the hospital so-called infectious waste and infectious after all, the people who put it in the bags don't get infected—into it each evening and set it to light and leave it over night burning and puffing away. There was the commercial one down near Pearland, which we went to court over and eventually got—got it shut down, not before the chimney on it, the stack, fell off because

it rusted through it was so coercive. And, I don't—I don't think it's back and working. It was—one problem was all these little things that were in the backyards, right in the middle of residential areas and right around the hospital. One of them in—in Houston had one of these things and the top of the stack was level with the air intakes into the IC—cardiac ICU and when the wind was right, waste just blew straight in and the nurse would tell you, well yes, it stinks in here sometimes from the incinerator. When—you had the same—an interesting problem up on Memorial City. They wanted to upgrade

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their medical waste incinerator on site. They came up with a pretty good quality pro—unit to put in—a commercial unit. It wasn't the best in the world by any matter or means, but it was a great deal better than what they were doing. The local people protested because they had to get a permit and it was never done because the people wanted to go on with the dirty thing that was there rather than have a clean one put in. It doesn't make sense. The—the Houston Hospital Counsel, which is an organization defunct, tried to organize a collective medical waste incinerator for the Houston area and organized, collecting up all the waste from the hospitals and going to one site. We had a high quality incinerator. When that was about time we were organizing the Erie Pennsylvania Medical Center had a American built medical waste incinerator, but it was really a pilot plant, which was extremely good, far better than anything else around municipal or medical waste. Really emissions from the municipal waste incinerator were no different from those in the medical waste incinerators. People thought the actual PBC mattered, it

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doesn't. We show very clearly that the amount of chloride going in to the fuel, in the fuel of—the incinerator made very little difference than the amount of dioxins. It was a way you dealt with the—the burning process and the after effects that mattered. And the Hamot facility in Eerie did very well indeed and was a prototype for others. I might say in parenthesis that my view is that if you, and I think you should, have the medical waste segregated at the hospital site in red bags and boxes and what have you, and then it goes to a special chute into a municipal waste incinerator so that you can log—you can monitor the radiation and make sure you don't put radioactive stuff in, monitor, barcode the boxes so that you know exactly where they came from and whose—what was going in and you weigh them on the way of course, and then you charge the com—the hospital. And just use the well-run municipal waste incinerator to deal with our medical waste. There really isn't any difference between that waste and the stuff that comes out of a hotel. What is

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important is the incinerator have the design characteristics that result in small—only small quantities of dioxin and mercury escaping, and that can be done. We know how to do it extremely well. One of the derivatives of the design that was used at Hamot Eerie, was built in Kings College for Kings College Hospital in London. And actually the firebox—incinerator part of it is built in New Zealand and the rest of it was built in Pittsburgh and then they shipped them put together. And they were about finished with it, building it, and the three medical waste incinerators in London, one went—or two went down, one was down for repairs or something like that, and anyway, there was not enough medical waste incinerating capacity an area to deal with all the medical waste. And the ministry of health approached the people doing the Kings College Hospital building—building it, and asked when will you be finished? And they said, well, we hope to have it finished in about a

month. Can you do it any quicker than that, we've got this stuff and don't know what to do with it? It's been sitting in re-refrigerator trucks around. I said, well, I
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suppose if we work 24 hours a day and with a bit of luck, we can do it in a week. They said all right, we'll pay, do it. Actually they finished it in three days. They really only had some electronics to connect up and get going and test to some extent, and fire it up. And it ran im-I mean they ran it immediately. And immediately, by that time, the side streets were choked with these refrigerator trucks grinding away there. And so they loaded the thing up with as much waste as-assigned capacity, you can't overload it because it's got shutdown-automatic shutdowns on things. The art of managing.. it's important in incinerators or the operators cannot-they can shut the whole thing down, but they can't fiddle any of the controls, they're built in, locked, at the weight of waste going in is set and that's it and you can't increase it and overload it. And again, the settings for the emissions are set and locked and you can't change it. If the oxygen goes down too low or the carbon dioxide goes too high, it shuts down and you can't do anything without getting back to the manufacturer. So it makes it very simple to find out what's going on. The incinerator probably in general, and the-and the general combustion problem inevitably makes things that aren't carbon dioxide and water and in terms of public health, one needs to reduce the amount of particles less than two microns in the diameter

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of the generator, carbonates cord particles. They're the main source of the pollution, whether it be from a diesel engine or from an incinerator, and then reduce the amount of organic compounds that are very adverse, and of those obviously, the one that's known to everyone is dioxin, but there are polychlorate hydrocarbons that come out to. So polyaromatic hydrocarbons as well, all of which are not good for you. The technologies which result in the lowest emissions of those are also-are the same for each of them basically. It happens to be that those also are pretty efficient at getting rid of the mercury that may come through and the Kings College Hospital example is a very good because when that-they were running this thing and it had to be running about a week full load, someone said, we better test and see what the emissions look like. And when they did, the answer from the stack was the emissions were lower than the background, eye London air for both mercury and dioxin. They said they can't be. Well, it happens there was another two of these incinerators similar, they're clones in-elsewhere in the world,

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one in Australia, which was very similar results. In fact you could put those out side by side, you couldn't tell which one was which. And they said that's the way it is, do it again. And they did it a second time with all the care they could and they got exactly the same results basically-that the emissions from this incinerator were-was cleaning up the London air from dioxins, mercury, and other organic compounds. In other words, we know have to do it very well, it's just a question. People don't (?) because you move better controls, it's more expensive, it isn't. As a matter of fact, it's-this plant at Kings College is cheaper than the one up in New York, which is the (?) best in this country. There's nothing like it. It's an order of magnitude, dirtier. It does require very strict management too in the sense that you don't let people loose doing strange things in the middle of the night. It's happened to one incinerator where the workers wanted to watch the televisions so they loaded the-the incinerator up with waste-overriding, because they could on that particular thing, it wasn't

one of the ones I am talking like at Kings College,

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where they could override the cutoff. So they over-overloaded it and lit it up and, soaked it up, and off they went to look at their restroom or recreation room to look at the television. And it burnt very well, too hot, it softened and deformed the neoprene seals on the air pollution control devices and when it was tested some months later, it was severe emissions coming through. And the company complained to the manufacturer and he said and that's what you've done to it. I am coming over to see it, so he left the United States and went and visited this country and looked at the thing and looked to the records. He very quickly saw these huge peaks in temperature. I said well what were you doing at that time, it's the middle of the night? And it soon turned out that they'd overloaded the thing and softened the casquets and the air pollution devices and it just leaked. You don't need very much leak to make an enormous difference to the out-the emissions. And so, and that's what happens. You have to have, I think, strict computer control. There is one company that at one time used its in-house computer to monitor its units out in the field and could ring up and say you're letting it get too hot or whatever else you like. You need to do so and so, that's the way to do it.

DT: Well let's switch topics for just a moment and touch on some energy issues. I believe you were involved in opposing the Allen's Creek...

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DM: Well yes, well that was to have been the largest and dirtiest nuclear emissions plant in the United States—electrical generating plant in the United States. It was interesting in many ways. The first thing, at the time it went to hearing, there wasn't a complete design. H L & P had got young engineers from college who had no experience with nuclear power plants what so ever, doing the design as they built the darn thing. It was a very similar problem at the south Texas plant, which was also going at that time. And I was involved, because again, the transmission lines were going to go through the migratory field feeding grounds and migration track for the duck and geese along the—of the KT Prairie and down to Freeport area. And so I was involved, that was my

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contention in the thing. Others were—of course the economics of the situation, the nuclear emissions, and simply poor design of the whole thing. It was a—and there was the issue of the water withdrawals from the Brazos River that were required to make this proposed lake, which may get built now for recreational purposes. And all of these combined together, it was a very long and tedious hearing, one of the largest administrative hearings that the federal government had ever dealt with. I think it went to 600,000 pages of—of record, many months. And I was involved with this continuously more or less.

DT: What were some of the economic problems that you pointed out?

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DM: Oh just—the economic analysis really didn't correspond with the—the facts they were giving. And two attorneys pulled them completely to pieces. Eventually, Baker and Botts recognized and must have advised HL & P [Houston Lighting and Power] that this was a lost cause. They spent 300 million—over 300 million on pushing the Allen Street plants and eventually abandoned it, the whole project. It was a disaster, it was far too close to Houston in the first place, it was bad from the water point of view because at Brazos River water is (?) the new Texas city and industry down there and to short circuited up to sea level meant

that they were going to be short changed down stream.

DT: You say it was a dirty plant, in what sense was that?

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DM: Oh, the emissions from the various bits of the plant were going to be much higher than any other nuclear power plant in this country.

DT: Why was that?

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DM: Design failures, basically. They just did—didn't have the competence or the concern to minimize their emissions and the nuclear regulatory commission was not very happy with their proposal and some of us were even less happy and eventually HL & P recognized that they were going to go nowhere and abandoned the issue. Good—I mean we saved—if you (inaudible) I think it was 5 billion dollars for the plant and we reckoned it would probably have cost about 10 billion and most of that would have been tax money. I mean indirectly because it's like (?) cost would go up to pay for it. The—there are all sorts of problems that arise with the peaking process required in the demand and it goes into the elec—electrical generating issue and costs and economics. It's a—the economics of this, I didn't go into it very much, but I recognized that there is a very complex situation of not much margin, or no margin, and part of the problem lies in the variability and the demand for electrical power supply—very short notice relatively speaking. The—and it's, you know, we have problems with the Parris plants and it's coal

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burning emissions and difficulty of getting adequate controls on those for particles of mercury and other emissions. I mean in the Texas 2000 study in the Houston area airplanes flying over knew when they went over the plants, you could see the emissions go up and come down again. And the same applied for for instance Chocolate Bayou Plant, you recognize where it is by the emissions and the volatile organic compounds over the plant. And these aren't necessary—or I should I say they're avoidable. One of the big issues—there are two big issues in plant emissions. One that the assumption has been that flares burn 90% plus of the VOC's going up the stack. The evidence for this fallacious, it is not true, it may be only 70% and maybe lower than that at some of them. Some of the Can—some of the California studies suggest been as low as 60% of these. And since the flow up these things is quite substantial, the amount coming out in the air is significant. The other one which has been studied here and also—and in California and

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done maybe somewhere else too, is even more interesting. It's the cooling towers.

Everyone assumed that cooling towers were innocent creatures. They are a major source of volatile organic compounds. The reason being is that the water from the unit of the plant gets contaminated—gets—is—sorry—the gasses (inaudible) or fluid coming from the plant needs to be cooled to do something. You go through heat exchange. The heat exchanger is cooled by the water, the water goes from the heat exchanger into the cooling tower and down through the air stream and comes out the bottom and recycled back in again—cooled. And the reason the towers are so bad is the heat exchangers leak and the heat exchangers leak sometimes because of corrosion, but much more frequently because of breakdowns in the compressors. Usually the gas stream going—being cooled is under high pressure. And so a very small leak results in a large quantity of product escaping into the water system. And these ones we have been interested in are ethylene,

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propylene, and butadiene, and all of these are relatively insoluble in water so when they get in the—get out in the—in the tower, the—the water stream dropping through gravity through the tower and the air stream going up, they strip the volatile organic compounds off to an efficiency of about 95%. Well, the flow going into these cooling towers in the order of 250,000 gallons per minute. And so if you're organic concentration is only two ppb, part per billion in that water, that's an enormous amount of chemical. And California has recognized this and is now beginning to require backup compressors and backup heat exchanges for its units. That is one approach. The heat exchanges leak because the compressors break down, drops the pressure on the gas stream, and the thing expands and the gas gets a leak then the pressure gets up again and of course gas leaks out of the cracks. They also may drop in temperature and that may...

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DT: Earlier you were talking about upset emissions and about emissions that are found in the cooling tower vapors, and I wondering if you could tell us how much of these emissions were actually factored into the permits that were issued to the plants.

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DM: (?) emissions are not recognized at all, they don't occur in the permit, the don't—they are non-existent as far as permitting goes, they're outside it. Now, that's wro—I think wrong. The permits should cover your total plant emissions...

DT: (Inaudible)

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DM: And now the—that's huge too and the valves and all the things that leak and the breakdowns when you have a pipe break or whatever else. All that's never—never part of the plant emission permit. The cooling towers, they use this—they weren't even considered in the permit because no one believed they did anything and the flares had this mystical 95% destruction process, so you measured the gas going in, it said 95% is going to be gone, burned at the top, and the rests is what's going to come out. Well, that was blown—that argument was completely lost, disappeared, with the Texas 2000 study, which we spent, you know, multiple million dollars on with up to five planes circling the area at the times at different levels. And you could see where the plants were because there's a plume over them of organic emissions, particularly vin—ethylene, propylene, and butadiene, three of the most reactive chemicals of producing ozone. It's why Houston is different from every other urban city—urban co—urban megalopolis. We all have the background of the cars and the trucks and we have a pretty serious truck problem with I10 going right through the middle of town, but on top of that we build spikes and they're narrow and steep. In fact on Monday this week, the ozone

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concentration going—was going up at 60 ppb per minute and they're a vertical climb. It went up to, I've forgotten, 200 nearly or something. Now this is reactions in a plume, I'm not sure it's—the reaction is accounted for by the current atmospheric chemistry, I think it's not. I think the rate process is too high. I think the fine particulates, because of the metals they carry as well condense on their surfaces from combustion sources, act as catalysts in this process and accelerate it substantially. One has to recognize that combustion generated fine particles, less than two microns—less than one micron are basically garbage bags of pollution. They are a carbon matrix which hold a garbage full of

all sorts of chemicals to absorb them at different rates. And the chemicals don't compete in absorption, so basically you get an enormous amount of chemicals on them and often combustion generated particles from incinerators or diesels may have as much

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as a third of their mass is due to the absorbed organic chemicals. That's why they're so poisonous to you. It's why—inhalation of fine particles for a very short time, it doesn't matter whether it's the stop sign of the diesel truck or whatever else that blows from an incinerator or a combustion source, is so important to the health. It's why EPA is wrong, fundamentally wrong, in using a 24-hour base and then only going six days a week anyways—every six days. It should be every five minutes, I don't think we have the technology to do that too well, but you can do every 15 minutes very efficiently. And those we monitor should be measuring all the time on continuous monitors around plants in the cities and wherever else we need to. The problem with the emissions in the cooling towers is no one really got around to thinking that they could be this kind of problem, they just didn't do their homework and think. But when you flew an aircraft across it and saw the plume, you better explain how it got there.

DT: What do you think the reason for not having data about these emissions?

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DM: Because no one flew an airplane over it and made the measurements and no one thought about doing the measurements. And the techniques of doing—of doing this from the ground is just too difficult to do satisfactory with any confidence in the results you get. FDIR is—does give you clues that there is a problem, but it doesn't tell you quantitatively how much is there.

DT: But do you think it was just laziness or ignorance or do you think it was deceit?

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DM: I think for a few people it was willful deceit and obstruction. The majority, because (?) aren't employed to think. They aren't interested in the problem of what do you need to do to protect the public health and reduce the cost—health cost of air pollution or other things we do. And of course we got a—a community problem because people smoke, that's terrible. People store solvents and paints in their house and don't think about this as a health problem. You've got those deodorants sitting in many people's bathrooms and—and restrooms and many of them, about 70% of the market, use their compound, there's a known carcinogen that evaporates. You won't be finding one in this house. The paint is outside, which I avoid having sprays of any kind in the

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house—hairsprays or anything else. None of them are good for you and until are education system and society gets around to recognizing the self inflicted injuries they produce, I don't think we can go much further forward. I—I'm skeptical about how much change in public health will occur if we were successful in getting people to not injure themselves by obesity, not exercising, smoking, and not putting themselves in the way of many chemicals including the stuff on the roads. When there is a problem here of public perception of public self interest and there's a limited amount you can do yourself.

DT: Is it lack of knowledge or is it lack of will?

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DM: Well obesity obviously is the lack of self control and lack of knowledge and of course the temptation we put in schools, we set a patent in the schools and at home where parents,

the mother works, and doesn't cook, they don't eat vegetables, they go and get from fast food place or other (?) cooked ready to go or open a tin, warm it up and use it. And that's not satisfactory.

DT: Well when you step back and you look at the health problems that you've seen over your practice, what do you think have been the most significant ones?

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DM: Well I think getting—getting through to people to recognize that the combustion generated fine particles—of the particles that are in the atmosphere, the only ones that really matter to your health are the carbonaceous products of combustion and the chemicals they absorb. And I think that is becoming perceived. I have upstairs, it just arrived and I haven't read all of it, the latest draft on particulates from EPA for scientific review and I have been under the table given me—given a copy to look at and I have several friends in EPA and I see in there that they are beginning to recognize we need to do more. Several people have shown in the, particularly an article in the New York Times some years ago that if you only look at 24 hours, you miss the high exposures and you can have a peak of a thousand micrograms per meter in the air for ten minutes, but over 24 hours, that peak is lost and it's unrecognizable that you had this huge exposure.

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Now the assumption that you—a continuous exposure is equal to that same mass as a narrow peak is not true. I think it may be true to some extent with ozone where it takes several hours to do the damage, but with things like fine particulates or cyanide or sulfur oxide, one sneak peak is all you need—or smoking. People who are sensitive to cigarette smoke—I mean three minutes in a room and they begin to have problems and they recognize it and get out and it takes 48 hours to recover. And the same applies to all these others only we don't recognize it—sorry.

DT: I am just curious, if it's apparent to people who suffer that quickly that there is a problem and yet there's still this sort of 24 hour averaging standard...

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DM: Because the lawyers and the regulators who don't understand. They aren't interested in public health and don't understand it.

DT: So it's not a question of deceit or negligence, it's...

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DM: No, it's a willful avoidance of knowing the new technology that's come in. I mean fifteen years ago we couldn't have measured the particulates in five-minute intervals or ten minutes or an hour intervals even, now you can. I mean you can have—basically there are on the—on the market, I don't know if they're commercially available, continuous particulate monitors that can give you the concentration the whole time basically. There are ones that can measure the polycyclic aromatic hydrocarbons in those particles continuously and the metals in those particles continuously. I don't think anyone's got a monitoring situation in the—in the community that wanted to research

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projects like this going around. One of our problems is you see Rice has this special air quality monitoring program going on, very fancy, very expensive air monitoring program, which is great, but we're not collecting the health data that goes with it. And I was—the scientific people at EPA and I know a good many of them. I mean I attacked them over this. I have—I have difficulty in seeing why we funded them because they don't go and

investigate. Do your thing in parallel and do it right the first time. Now there are other places that are trying to do the health data in parallel with super site measurements of the particulates—the emissions and the air pollution, but we are not and we have the most desirable place to do it with all the options because they're all here as a result of the huge industry around us.

DT: I know you've been frustrated that epidemiological work hasn't been done on humans, but I understand that you have been interested in birds for many years and their role in being a monitor of the environment.

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DM: The earliest biological monitors were the canaries in the mines and telling you when the carbon monoxide gets too high. And incidentally, there are now monitors that miners wear, specially developed for the purpose, for telling when the particulates get too high in the mine and sometime the—the air exchange system is not working adequately and if it's some coal dust and a risk of explosions. So, we're getting there. The technology is getting there. The birds—and incidentally insects and amphibians are very sensitive indicators of the quality of the environment in which we live. The National Academy of Sciences some years ago pointing out and advising EPA that you can't protect public health, or the only way to protect public health is to protect the quality of the environment in total and in doing so you'll protect the public health. You've got to do it as a holistic, inclusive effort. You can't do little bits here and there, that won't be successful. And I think the failure to use the scientific data to set regulations for the

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particles less than two microns, is a very good example of this situation. Now if you say that—do we have the technology to get those particles out of the emissions from combustion sources? Not entirely, but we can make tremendous difference to what's there now. We are getting there, I don't think we can totally eliminate where the current technology that I'm aware of to the lowest levels—protection levels, but you surely get the mercury and the emissions down to—and the dioxin emissions down to the limits of current tech—chemical technology—chemical analysis technology. I mean one of the problems of setting any more lower dioxin limits for emissions lies in the problem of doing the measurements to the degree—reasonable degree of accuracy. One of the things we don't do and we should have been doing for a long time is deliberately collecting particles and extracting the organic and metals from them to see which are giving the problems.

We—current research clearly indicates that one of the sources of the cardiac

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problems from combustion generated air pollution, i.e. smog, is the metals, the transition metals, which are particularly vanadium and iron, which are bound of these particles. Now there are probably some other chemicals that are involved and probably other mechanisms, which give the transfer of the exposure in the lung to the injury to the heart muscles contracting cells. We know one biochemical change that does this. I am sure there are others that we know nothing about. In fact, I think there is a very good reason for being others. The one we know about takes 18, 30 hours. That's what you see in the smog exposures, the deaths begin to occur about 18 hours onwards for several days. But there is a—from halter monitoring, continuous monitoring of people's hearts. A little bit of data that says from events that occur from air pollution and exposure, which occur in about ten minutes, must be some totally different route.

DT: Are some of these effects showing up in avian populations?

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DM: Well, yes of course we've had the pesticide problem and the thinning of the shells and why brown pelicans became extinct on the upper Texas coast back in '63 or so. And they've only just recently come back; they're re-populated from Mexico and elsewhere. But also changes were inducing in the environment are reducing bird populations and this particularly occurs for the migratory birds and the southern or winter range in the central-Central Americas where loss of rain forest is devastating, but we also do damage up here when birds get into poison playas out in West Texas or as it was at the brio site when the water was shallow and inviting to birds and animals. No big effort has been made—made I think to measure the effects on breeding bird populations, but of course

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there's a data coming out on amphibians, particularly frogs and their deformities and there are some other ones going on around that in small—small studies of—or partic—specific site plants pollutions. I think much more serious to me, which we're not dealing with, is continued disposal of household and industrial and medical waste in landfills. The best landfills are leaking and we are now finding drugs like antidepressants, anti-epileptic drugs, antibiotics in the ground water supplying big communities. And that wouldn't happen if you destroyed these chemicals by burning them—oxidation instead of just dumping them in the ground and saying bye bye. The fact that you put a clay liner and another liner and you collected up the (?) water and recycled it and what have you, it doesn't solve the problem.

DT: Well what sort of advice would you give to the next generation to help solve some of these problems?

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DM: Oh we've got—we've got to stop driving cars over—of the kind of design that we are using at the present time. I mean that's got to—and the whole of this—we've to rework our whole concept of fuels and combustion process. Hydrogen in the obvious fuel to use and there—the tub of Rome meeting in—up in the woodlands under Mitchell's juri—guidance some years ago, there was a man—a German, Vinegard, Dr. Vinegard who got one of Mitchell prize for his analysis of hydrogen economy and I—I have—the tape of his paper and I've actually interviewed him for this KPFT Pacifica program. Yeah, it's obviously doable, we are now getting engines running on hydrogen, busses in Chicago, and we could do a great deal more with this. We—there's a great deal of resistance. Part of it is economical capital investment. You know, car companies are designed to build cars this way. To do it any other way, it requires a great rethink and a

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retooling a re-planning of the system. That's one thing I think we need to control our population, we can't go on growing at this rate. And again there's a problem of this urban sprawl that's doing us all damage. I mean in the Houston, Galveston area, the eight counties, we're spending about ten to twelve percent of our productivity in transport, going around, getting from A to B. And that's a terrible waste. Other communities are not doing this. Now, unfortunately, elsewhere in the world they all want to do exactly the same thing—build huge cities. And very few are condensing themselves into smaller areas. Of course the Chinese are trying to restrict their population growth. They understand the statistics of the problem. There's a job problem that we have worldwide about a billion people

unemployed, maybe even bigger than that. To me, this has two features. One is that the unemployed are politically unstable and liable to be impressed by orators of great persuasion and therefore not necessarily

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peacefully minded. And there's the other bit that comes from the late Lord Keynes, Maynard Keynes in the book *Economic Consequences and the Peace* and he pointed out, it an unreasonable assumption to assume of all those that are going to die of starvation will die quietly. I think there's a very good reason that he's right. You saw what was happening in Somalia. We see everywhere else the fighting basically over land and supplies—oil or fuel or food. It's a major issue and we are polluting. Just too many cars and too many of us. And China—everyone wants a car. Everyone—everyone—if every Chinese had a car as in Europe and, not even considering the American standard, the pollution would be dreadful and the use of resources would exhaust the world and I know I can seek to have any concept of how we would work in a situation where fuel sources really were very difficult to deal with. And nuclear power plant is not going to solve the problem. We've got no way of dealing with product there.

DT: Let me ask you one last question—clearly your concern for people's health has driven your interest I a lot of these environmental issues, but I wonder if there's also a joy in going to a particular place, a spot in nature that is also inspired you.

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DM: Oh yes, the Christmas counts particularly have been very interesting the way they changed with the growth of the urban population. And I suppose most notably Galveston's changed over the last forty years in the—the island because of the destruction of habitat, breaking it up. Some of the places were delightful to go to.

DT: Tell us about one.

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DM: Well, there are a series of bits along the shore where there were clumps of Salt Cedar and other marsh that are gone. Just west, southwest of 61st Street, and there on the sea wall, was a large area of wetlands and what have you and then there's an—actually tidal ditch, (?) call it bayou in the middle, and we fought with the developers who wanted to fill that in to make it a concrete ditch. And under the Clean Water Act that has been preserved. It's still quite heavily used by aquatic birds, but there was a large area that flooded and I can well remember one morning, I suppose a Saturday morning, two men with four horses tried to pull a truck, a light truck, out of the mud that had sunk in there. They had driven too far, gotten to the soft ground and gone in. They got these horses trying to pull this thing out. That's gone, it's built over now. We've lost wetland habitat in a big way around the bay, which used to be fun to go to and always full of surprises.

DT: What sort of surprises would you see?

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DM: Oh birds that don't normally regularly occur here. Or, you know, able to get very close to spoonbills from the road.

DT: Is that the roseate spoonbill?

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DM: Yeah, roseate spoonbill. There was—where Port Bolivar is now, there was a clump of relatively low trees which was a rookery for egrets and the night herons and then some idiot cut them down and they've done nothing with the land since they cut it down, but

we've lost a nice ecosystem there. It's—it's changed. I used to enjoy being able to get straight down to the Galveston breakwater along the ship channel there, whatever the park is right at the far east end of the Galveston Island, then turned down. Some—someone's names, now you've got to pay to park practically all year now. In the winter you used to be able to get in winter free, but the last—last spring, early, I couldn't—the wanted to charge me five dollars to go in there. That—that galls me.

DT: Maybe we could end this by asking you about a bird that I think you've done a lot to help and that's the prairie chicken. Can you describe the booming?

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DM: Oh it's a wonderful—it's an eerie sound because you—you only hear it basically early in the morning when the dawn is breaking and just a short while afterwards. And there used to be a lake on Fondren Road south of Brays Bayou, just where that great big church is built and when the '60's, early '60's, the MD Anderson has an annual cancer research symposium in the spring, February or March, actually it was always timed to go with the—the (?) show, which was a good time to go (?) some birds, including prairie chickens and I would quite often get asked to take ornithologists, people with bird interest, taking someone bird watching in the morning before—before the meetings began. And we'd go down there and look at the prairie chickens booming.

DT: What was the dance like?

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DM: Oh, when you see Indians doing their dancing, going around and flapping their wings and "oom, eye ah eye ah," very penetrating, caring on, it's very low frequency but that means it carries a very long way like elephant calls and they are prancing around, two or three of them with each other, and the ladies are sitting just watching taking no interest at all basically. And there were of course these—this group down off of, near Dickinson that's still there and they're actually expanding we think.

DT: That's encouraging to hear.

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DM: Prairie chickens are very fascinating birds because we're trying to reestablish them in numbers in a habitat isn't the one they developed in. They developed in tall grass prairie. Reed, what's his name? A man Buckler who wrote—wrote—the bit of the book I know about is—is describing leading Houston in the early 1930's, '33 or something of that sort, and writing to Austin. And he describes I—the trees I left behind along the ends of the bayous from there on, it was through the grass that was belly high to my horse and often over my head. Now the prairie chickens lived on the ground in the bottom of that canopy, whatever you have to call it, that blanket so predators couldn't find them. The—the raccoons and the possums and all the other people might eat them—the young couldn't find them. Fire ants weren't here and they developed and evolved at a bird, or

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ground bird, living under this thick blanket where they could hide away very easily. You grazed it off so now the density of the grass, and I was out there last Sunday, Saturday, is not high enough to really cover them up. McCartney rose a—grown—grown in, it's not a typical native species of prairies. It's so dense that birds can't get through and underneath, so it's absolutely not protection. And raccoons and possums and everyone else can walk through this grass and find the young and we've got fire ants (?) eat them. So we've got—

they've got some very really problems. Several years ago a group of us at Fish and Wildlife Service, sweat to square mile with a chain and ropes and what have you walking. One morning I found two birds in the densest place in this country were the prairie chickens. I—I think—we think their numbers have gone up since then, but that's how bad it was.

DT: Well to conclude, do you count yourself as an optimist or a pessimist?

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DM: It's hard to be really optimistic with the human behavior the way it is. I mean our gregarious behavior insistent on spreading out and needing our little pad as a status symbol in terms of getting together in communities and able to live in apartments and close—closely stacked buildings. It will be our undoing—undoing. I mean the Chinese and the Jap—and the Indians all want to have space around them and seek space and I'm not sure whether it's trying to emulate Europe and America or whether it is the genes of humans drive you to doing this. You know there's that ditty mind years ago—global war and global peace. No, global war and global peace nothing—no, global measures for war and peace, nothing now delays the plan but birth of global man. We haven't got that gene yet.

DT: I appreciate your time.

DM: Pleasure and I—I—interesting situation. I hope you can successfully—future people can use it.

DT: Good, thank you

[End of reel 2279]

[End of interview with David Marrack]