International Language Services, Inc.
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PARTICIPANTS:	Mary O'Lone Johanna Johnson Jeryl Covington Ericka Farrell Marianne Engelman Lado Elizabeth McLaughlin Dr. Jill Johnston
ABBREVIATIONS:	[U/I] Unintelligible [PH] Phonetic spelling Transcriptionist's note [ ] // - [Voices overlap]

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	[BEGINNING OF RECORDING]
ERICKA FARRELL:	Okay, we got Ericka Farrell from OCR Title 6 Office.
JERYL COVINGTON:	Jeryl Covington from OCR Title 6 Office.
MARY O'LONE:	This is Mary O'Lone, I'm from the Office of General Counsel.
JOHANNA JOHNSON:	Hi, this is Johanna Johnson, also from the Office of General Counsel.
MARIANNE ENGELMAN LADO:	Hi, there, thank you.
ERICKA FARRELL:	Okay. Oh, good, good afternoon. Again, this is Ericka Farrell, from the Office of Civil Rights Environmental Protection Agency in Washington, D.C. And thank you for taking the time to talk with us. And please be aware that this interview of Dr. Jill Johnston is being recorded. And are there any objections to recording this interview?
JOHANNA JOHNSON:	No.
MARY O'LONE:	Dr. Johnston, do you have any objections?
DR. JILL JOHNSTON:	No, I don't.
ERICKA FARRELL:	Okay, thank you. And as you know, your August 2014 study was submitted to OCR to rely upon in this investigation into whether North Carolina Department of Environment Quality Regulation of

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	Swine Feeding Operations discriminate against African-Americans, Latinos, and Native-Americans on the basis of race and national origin in neighboring counties in violation of Title 6 and EPA's implementing regulations. And today we plan to ask some, ask you some fundamental questions… I'm sorry, foundational questions, regarding the study, in order for OCR to determine whether we can rely on the study for our investigation. In doing so, we are trying to understand what issues or arguments may be raised in opposition to your study. And we may need to ask you further questions at a later date. And as we get started, we're going to start right now, Dr. Johnston, with just some basic background questions. And can you please state for the record your name?
MARIANNE ENGELMAN LADO:	Ericka? Ericka, if I can just interrupt for just a second. I just want to make sure, there was two studies that Dr. Wing [PH] and Dr. Johnston did, conducted, and then resubmitted. One was the 2014, which you mentioned. And the other was the revised version that's dated, it was Exhibit 12 to a submission earlier this year, and it was dated October 19, 2015. And it's based on the current set of hub facilities that have, that are under the general permit. I just want to make sure both are in front of you.
MARY O'LONE:	Well, Marianne, the other one is not. The second one, the update, that was going to be one of our questions. This is-- I'm sorry, this Mary O'Lone. That was going to be one of our questions. Jeryl is now looking to see if we have it in our record.
JERYL COVINGTON:	Right, as Exhibit 12, that's the des… declaration by Jessie May Brinson [PH].
DR. JILL JOHNSTON:	No.
MARY O'LONE:	No, she's saying she sent something this year.
DR. JILL JOHNSTON:	So, Jeryl, it's not Exhibit 12 to this Complaint, it's attachment 12 to a subsequent submission that we made in 2016 that contains Steve Wing's [PH] declaration and it contains the revisions--

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MARY O'LONE:	Where--
DR. JILL JOHNSTON:	--of this, of this study.
MARY O'LONE:	What's the date of that? 'Cause they're shake-- This is Mary again. They're shaking their heads, like OCR doesn't have it.
DR. JILL JOHNSTON:	I think it's all 12… You did receive it, I'm certain of that. April 12, 2016. And it had, and this is Attachment 12. And it's important that, you know, that we'll get into the methodologies and all that, but, you know, we wanted to make sure that there was a study of the actual data under the new permit. And the revised study is based on that, the data under the new permit.
MARY O'LONE:	Okay.
DR. JILL JOHNSTON:	And we could go ahead and if you can't find it you can ask questions based on--
MARY O'LONE:	Yeah.
DR. JILL JOHNSTON:	--the first study, and we can resume it another time. That will still be helpful, I'm sure, but it's important that you have that second study.
MARY O'LONE:	Are you… Marianne, this is Mary again. Are you at your desk? I mean, can you email it to Jeryl? And--
MARIANNE ENGELMAN LADO	Yes. I--
MARY O'LONE:	Email it to all of us, so that at least we know we have it. They'll go back and look for it, but I just want to make sure that we do get it today. But I also agree with you, 'cause I think unless the methodology changed from the report submitted with the

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	complaint to today's, the questions would be the same, and it's just a matter of the conclusions or results. Right? That's what would've changed, potentially.
MARIANNE ENGELMAN LADO:	That's right. I mean, I'll let Dr. Johnston speak and she'll answer specific questions about that. But the basic methodology is the same. There may have been some tweaks that when you focus on it she can answer questions about. So, Alexis is uhm is forwarding it and who's, so who's going to, if they look for an email--
DR. JILL JOHNSTON:	Is there just one email I can send it to? And I'll just forward it to your right now?
JERYL COVINGTON:	covington.jeryl
DR. JILL JOHNSTON:	Okay, got that.
JERYL COVINGTON:	@epa.gov.
MARY O'LONE:	We did not recei-- Yeah, we did not receive that. I don't have a copy of that.
JOHANNA JOHNSON:	Okay. All right, so back to the beginning.
ERICKA FARRELL:	Yeah. For the record, Dr. Johnson [sic], can you please provide your full name?
DR. JILL JOHNSTON:	Jill Elizabeth Johnston.
ERICKA FARRELL:	And please provide your professional contact information, specifically your office address and office telephone number and

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	office email.
DR. JILL JOHNSTON:	Yeah, it's 2001 North Soto Street, Los Angeles, California 90089. My office phone number is (323) 442-1099. My email is jillj@usc.edu.
ERICKA FARRELL:	Thank you. And as we begin, can you also state what your current professional position is?
DR. JILL JOHNSTON:	I'm Assistant Professor of Preventive Medicine in the Division of Environmental Health at the University of Southern California.
ERICKA FARRELL:	Okay. And as we begin also can you give us what your professional background is in relation to the studies that we're going to be talking about today?
DR. JILL JOHNSTON:	Yeah, I have a Ph.D. in environmental science and engineering, with a minor in public policy from the University of North Carolina at Chapel Hill. And I also completed a post-doctoral fellowship in environmental epidemiology, also at UNC.
ERICKA FARRELL:	Okay. And now, I'm going to turn this over to Mary O'Lone.
MARY O'LONE:	So this is Mary O'Lone. Dr. Johnston, Marianne's probably explained to you one of the reasons that we wanted to speak with you. And after we go through the questions that we have, you can see why it was a very good idea for us to speak to you first. Because what we wanted to do, when Marianne explained that Dr. Wing was ill and that, you know, if we had a chance to speak with him in the future, we wanted to try to limit the questions that, you know, we would be asking him. So, we really appreciate you making yourself available to answer these questions with us uhm… because I think there are a lot of them. And a lot of it comes from the fact that… that we don't have a particular background in this. So we're going to ask you probably some very basic questions from your perspective. But the first one is your role in the-- we're going to stop-- talk first about the 2014 study. And your role in that study.

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DR. JILL JOHNSTON:	Yeah, so I collected the data and conducted the analysis in consultation with Dr. Wing. And created the table that figures in this report, and helped with drafting the text. But Dr. Wing put the lead on writing the text for this.
MARY O'LONE:	Okay. Was this study peer reviewed? Or did it go through any kind of even an informal internal sort of peer review?
DR. JILL JOHNSTON:	There was discussion with other faculty within our department at University of North Carolina, but it was not submitted or considered under a scientific peer review process for a journal.
MARY O'LONE:	Okay. And we might as well ask, the update that was done: similar? Did you--
DR. JILL JOHNSTON:	Yeah, it's the same as, also not submitted, or have been under a scientific peer review.
MARY O'LONE:	Okay. Do you-- And Marianne, I don't know if this is, this is maybe a question for you, I don't know if it's for you or Dr. Johnston, but was the… was the 2014 study submitted to North Carolina DEQ?
MARIANNE ENGELMAN LADO:	No.
MARY O'LONE:	Okay. Do you know if they're aware of it?
MARIANNE ENGELMAN LADO:	Not to my knowledge.
MARY O'LONE:	Okay. All right. Now we're going to get into sort of the nuts and bolts of the questions that we had about the study itself. So, Dr. Johnston, do you know, can you explain why three miles was

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	chosen as the distance?
DR. JILL JOHNSTON:	Yeah, it's where we've been [U/I] on a few, paid for a few peer reviewed scientific studies, one was by Mirabelli [PH] from 2006, that specifically looked at asthma prevalence in middle school students in North Carolina, and found that middle schools within a few mile radius of industrial hub operations had higher prevalence of asthma and other asthma related symptoms compared to students who went to school farther away. Also, some dispersion modeling of hydrogen sulfide conducted at a large [U/I] CAFO in Iowa showed that hydrogen sulfide can travel up to six kilometers, which is a little over three miles from the facility itself, and impact air quality in that radius. And there was also sort of a few other studies that looked at the relationship between hydrogen sulfide through [U/I] and hoe CAFOs one from North Carolina and one from Iowa uhm… the one from North Carolina being by [U/I] in 2016 and then by Pavilonis [PH] in 2013, that used five kilometers as… as their distance.
MARY O'LONE:	Okay, thanks. Did you, by any chance, look at other distances or analyze other distances that weren't discussed in the 2014 report?
DR. JILL JOHNSTON:	So we did not. We considered different criteria for inclusion of census blocks uhm… you know, whether any part was within three miles or whether their centroid. But we really don't have the capacity to compare our three mile results to two miles or one mile or some other criteria.
ERICKA FARRELL:	Okay. Okay. How was… so basic question, how was the block centroid determined? Was it--
DR. JILL JOHNSTON:	And--
ERICKA FARRELL:	Is it a geographic location?
DR. JILL	Yeah, so within our GIS software, with the central block data

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JOHNSTON:	from the U.S. Census 2010. And then yeah, the program assigned the centroid.
ERICKA FARRELL:	So it assigned it based on the geographic center of the block? Not something to do with the population.
DR. JILL JOHNSTON:	It had nothing to do with population, yeah, it had to do with spatial definition of where the centroid was being based on the shape of the block.
MARY O'LONE:	Okay. For the study area, 19 counties were excluded that didn't have an IHO and didn't border one. Why was it important to exclude those 19?
DR. JILL JOHNSTON:	We thought it was appropriate to consider populations that were potentially at risk for being near an industrial hub operation. And so, just the geography and mountainous nature of western North Carolina, you know, as well as highly urbanized areas, they're just not locations where CAFOS would be sited, so we didn't consider those populations at risk, and that did not include them in this study area for this analysis.
MARY O'LONE:	Okay, perfect.
JERYL COVINGTON:	Yes, this is Jeryl Covington. I do have one question on that one. You all were also excluding the counties that were adjacent to and had no-- Please give, can you explain the basis for that exclusion, as well? To the 19 counties in the western North Carolina area.
DR. JILL JOHNSTON:	Well, we excluded counties where… they had to meet two criteria. One is they had no CAFOS in their borders and no adjacent county to them had any CAFO. And it's largely because the areas are highly mountainous and don't have the stability or the land mass that you need for the liquid waste distribution system for a CAFO to be permitted there.
MARY O'LONE:	Is that good?

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JERYL COVINGTON:	Okay, uhm-hum.
MARY O'LONE:	This is Mary again. What is the… Can you explain the adjustment for rurality? And is that the same thing as adjusting for population density? And then why was that appropriate?
DR. JILL JOHNSTON:	Yeah. So, yes, the… the so this concept of rurality, we measured it by population density for each census block. And we find this… and so we present both the unadjusted and the adjusted values in the report. But find that this is important because the land availability and also typically the price of land is highly influenced by the population density and the amount of land that is available. And also different patterns of which racial or ethnic group live in which areas can be… can influence population density, as well. So, that's why we chose that concept of both a marker of kind of the economics and the land availability to adjust for in the models.
JERYL COVINGTON:	This is Jeryl again. Could you… could you clarify the land availability? I wasn't quite clear on that explanation.
DR. JILL JOHNSTON:	Okay. Yeah, so, I mean, as I mentioned before, not only do you need the bond to house the animals, but then also, you know, field around it, where the waste is sprayed. So in areas with a high population density, you're not going to have… it's not necessarily going to be appropriate to have the space or the availability to put a CAFO in those areas or to put as many. Uhm. And so it's basically, you know, the land available for agriculture--
JERYL COVINGTON:	Right, but you--
DR. JILL JOHNSTON:	--density has correlated with the population density of that area.
MARY O'LONE:	But that… okay. This is Mary again. Just 'cause I… you can't see me, but my brain's cranking very slowly. [Laughs] But, so this is

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	not because you were excluding these areas. 'Cause you've already excluded the 19 counties that have nothing. Now you're doing an adjustment to say, to basically say that, okay, in the… to find the… the… the more sparsely populate-- maybe… maybe we'll get into it when we get back into the tables and explaining those, but, you know, the f-- I'm trying to understand the fundamental point of why you did it. And it is to say that these things tend to go in really rural areas. And, you know, as we look at areas that get more and more rural, we also see, you know, what, where they are, the amounts of hogs there are, and a change in the demographics. Like, that's why you're doing the rurality piece to it?
DR. JILL JOHNSTON:	Yeah. I mean, so it's sort of a contest of, I guess you're familiar with confounding and other epidemiological models. So, we felt that population density is a very important factor that influences society of hog CAFOS. And so that's why we presented sort of adjusted models to acknowledge the fact that uhm population density and uh… add sort of a proxy for both the cost of land and the sort of amount of land that would be available for agricultural activities, was important to consider when we're looking at the association between race and permitting of hog CAFOS.
MARIANNE ENGELMAN LADO:	This is Marianne. Can I jump in for a sec?
MARY O'LONE:	Yeah.
MARIANNE ENGELMAN LADO:Z	On page four of the 2014 report, Dr. Johnston, you have a very [U/I] that says uhm, "By adjusting for pop density or rurality, we compare ratio vulnerability to IHH for racial groups within each level of rurality."
MARY O'LONE:	Right.
MARIANNE ENGELMAN LADO:	I think that's what you're getting at. Can you explain that a little bit more, what is… so it's not taking away the feeling, it's a way of testing for it by looking within each level rura-- I can't even say it-- rurality. Is there still a feeling it's a race this outcome?

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DR. JILL JOHNSTON:	So, right, that is correct, and we try to uhm provide an example here that perhaps if I laid it out more I'd fit in, that… for example, like when you're looking at mortality rates, and you want to compare class treated per population, it's important to account for age because your risk of mortality changes with different age groups. And so if the age structure of the two populations aren't equal, you want to adjust for those factors or account for those factors, so that you can look with any to age group. So essentially we're trying to account for the same thing here, that… that acknowledges that perhaps you're rigged for a CAFO being permitted nearby you uhm… it's different depending on the population density of the area where you live. And so by including that adjustment, we can account for those differences across different areas in North Carolina.
MARY O'LONE:	Okay. Is everybody good on that right now?
MARIANNE ENGELMAN LADO:	Uhm-hum, uhm-hum.
MARY O'LONE:	Okay. Okay, so the uh… can you explain this steady state live weight calculation? So we're on page four again, of the 2014 study. And how did you determine whether the steady state live weight of an IHO should be included? And I-- this is, it's not about the calculation of the stead state live weight, but more... how you captured a particular IHO. And I sort of have two visual images in my mind. And one has… has-- you take the centroid of a block and you draw a circle three miles out. Right?
DR. JILL JOHNSTON:	Okay.
MARY O'LONE:	This is what I'm thinking happened. And the latitude and longitude of any IHO that fell within that three mile circle is what you counted. Is that right?
DR. JILL JOHNSTON:	That' correct.

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MARY O'LONE:	All right.
DR. JILL JOHNSTON:	And it was summed. But yeah, we started at the centroid of each block. And did exactly as what you described.
MARY O'LONE:	Okay. Because what we were trying to figure out whether there was anything… whether it was like if you had, instead you were pulling, if there were a block that straddled the three mile circle, you know, you'd pull an IHO that might be sitting in that block. Do you know what I mean? But that's not what you did. You just, it was if the latitude and longitude of that CAFO fit in the circle. Then it was added to the total weight.
DR. JILL JOHNSTON:	Yeah, so in essence each CAFO was not counted one time, it could be counted multiple times, depending on how many blocks it was within three miles from.
MARIANNE ENGELMAN LADO:	In other words-- this is Marianne Engelman Lado again. Dr. Johnston, if there was a CAFO that straddled those, that three mile radius or was in one radius, then in another radius, how would you handle it?
DR. JILL JOHNSTON:	So yeah, so we were-- our unit of analysis is the census block. And so for each census block, sort of independent of all the other ones, we would draw the three mile radius and count up every CAFO that fell within the three miles. And then we would go to the next, you know, the adjacent block to it, draw a circle and count up every CAFO within three miles of that block. And so, so the sum in the steady state wide weight could be counted, you know, if not-- we didn't assign each CAFO only to one block.
MARIANNE ENGELMAN LADO:	Sure.
DR. JILL JOHNSTON:	We assigned each block to the nearby CAFO. Does that help explain it?

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MARY O'LONE:	I think so. Well, so then the next… I guess my next question is, when you look at the people. So the latitude and the longitude has to be within a three-mile circle. And then when you count the people, how are you doing that?
DR. JILL JOHNSTON:	So the people are counted more than once. We… we uh include the population of each census block. So, all the-- there's 100 people living in the census block, they're all assigned the same steady state live weight--
MARY O'LONE:	Right.
DR. JILL JOHNSTON:	--based on what's the three-mile radius.
MARY O'LONE:	Okay, okay.
DR. JILL JOHNSTON:	Those people are not counted more than once in the model.
MARY O'LONE:	Okay, I get it. Anybody else have any questions on that steady state live weight? All right. Okay, the next question was about the, you know, asking you about the update. Did the update happen? But we know that it did, so we will skip that one and come back to it at a later date, probably. So, on page four… uhm, you describe how race and ethnicity was categorized. But then when we looked at the complaint, we went and we looked at page, where is it, 106. Okay, on page, I don't know what, 35 of the complaint, it also talks about the characterization, in particular, of African-Americans, and the descriptions seemed inconsistent to us. And it had to do with black his-- people who could identify themselves as black and Hispanic. And so we were wondering if these two… if the statement about it on page four of the 2014 report and footnote 106 on page 35 of the complaint, whether they were inconsistent or weren't inconsistent or, you know, like how we should be interpreting this?
DR. JILL JOHNSTON:	If I can describe the definition we used in the report, and then maybe Marianne can talk about the footnote. But CU's for one of

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	the census categories, and so our definition of black was anyone who identified as… identified themselves as African-American, or black with or without any other race or ethnicity. So if they identified as black and Hispanic, they would be categorized in this black group. So that's how we did it for the purposes of this.
MARY O'LONE:	Okay.
MARIANNE ENGELMAN LADO:	And say, Dr. Johnston, in, on page four, it says "black," is people who identified themselves as African-American or black with or without any other race.
DR. JILL JOHNSTON:	Yes.
MARIANNE ENGELMAN LADO:	Right? I thought I just heard only without. With-- I'm sorry, without. [Laughs]
DR. JILL JOHNSTON:	No. No, I'm sorry, if I said that, I misstated. No, I meant yes, how it's in here is correct. So, it's--
MARIANNE ENGELMAN LADO:	Right. And footnote 106 says the term "African-American herein corresponds to the term black as used in the report, it… the black racial category refer to those who identified as African-Amer--" Oh, that's probably a typo, it should be with or without.
MARY O'LONE:	Okay. All right.
JOHANNA JOHNSON:	Hi, this is Johanna Johnson, I just have one quick follow up question, and that's with regards to individuals who identify themselves as black Hispanic. You indicated they would be categorized in the black category. But would they also appear in the Hispanic category, as well?
DR. JILL JOHNSTON:	Yeah, so I only know one of the tables, these terms, that the definitions of black, Hispanic and American-Indian, we did not use mutually exclusive ter-- or mutually exclusive categories. So,

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	people, when we do the race specific analyses, they could be counted with more than one race. You know, based on what they identified on their census forms.
MARY O'LONE:	Okay. Any other questions here?
DR. JILL JOHNSTON:	But the category of non-Hispanic White and people of color, those two are mutually exclusive. So there's no one that overlaps. You know, which is what we use for our primary analyses.
MARY O'LONE:	Right. Okay. Anything else? No? Okay. Now what we'd like to do, and Marianne, maybe you can help in this, in the update that was sent, you know, is it just the numbers that have changed? Well, let me explain what I'm going to do here. What we wanted to do was walk through in the study each of the tables, each of the figures and tables, to make sure we understand what they say. And then we wanted to look at them, look at how they're characterized in the complaint. Because one of the things that we have to do as we discuss it internally is be able to communicate in layman's terms how these… what… what these findings are. So we want to make sure that we understand it. And we can see that the complaint takes… you know, writes up something. And so we wanted to see, we wanted to make sure that, you know, what was in the study, I mean, what was in the complaint, we could, you know, use that as our layman's discussion. So we wanted to crosswalk these things. But also go through them and make sure that we actually understand, you know, what the study itself was saying. Okay?
MARIANNE ENGELMAN LADO:	Let me, yeah, let me give some context. And I don't know if this will be helpful or not, but let's try. First of all, Elizabeth reminded me, and we will double check, that when we filed the complaint, we probably sent a copy to then DEMA [PH] now DEQ.
MARY O'LONE:	I think that's right.
MARIANNE ENGELMAN LADO:	There were some confidential documents in there, so we didn't send the whole thing, and we'll have to go back and check our records and let you know what we sent and what we didn't. I

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	don't see any reason-- I mean, this was not a confidential document. But I just don't remember. So, and I'm not sitting on front of the, you know, my computer where I can pull up exactly what was sent to DEQ. So, so we'll do that and we'll… we'll get back to you on that. In terms of the difference, let me tell you our… our thinking and methodology as complainants, and then Dr. Johnston can say a little bit about what might've been different, if… if you remember, Dr. Johnston. So, we obviously wanted to get, even though the 180 day requirements is waivable, we wanted to get a complete set of allegations into OCI within 180 days. So, we wanted to do it, just submit a disproportionality analysis that was rigorous within that 180 day timeline, that challenges at the 180 day timeline, the uhm the… the data uhm wasn't… I think it wasn't even up on the website for DEQ or then DENA. But if it was, not with sufficient notice to be able to ask Dr. Wing and Dr. Johnston to do an analysis. So, talking to… knowing that there wasn't going to be that much difference in the location of these facilities, uhm for technical reason which you may be aware of, that any new facilities in the State of North Carolina, have to use new technologies. And it's only preexisting facilities that haven't expanded that are under the state general permit. So while some facilities may drop out of the list, there are not going to be any new facilities on the list, and there's kind of a disincentive to drop out. So we knew there wouldn't be that much change.
MARY O'LONE:	Uhm-hum.
MARIANNE ENGELMAN LADO:	So uhm we did ask Dr. Wing and Dr. Johnston if it made sense to do the disparities analysis first, on…. on the risks that existed uhm at the time right before we filed the complaint, which is what they did, with the ex-- and then… and they can refine their methodology by doing that, building on the work that they had previously done on disproportionality. And then, once… once we had the list-- and… and I should say, and Dr. Johnston can talk more about this, there was a lot of work that went into that, there was a lot of cleanup of the data. [Stutters] Uhm… the geographic locations often weren't right. There was just a lot of work that went into working with that list. And then, they were able to provide the 2014 disproportionality analysis, but with the full intent that once we had the uhm, the list of facilities that had been approved for operation under the challenge firm and under the new permit, they would then conduct the same analysis. But I say "the same" kind of in quotes, because if there were any

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	lessons learned or any tweaks that the new data provided, that they were free to kind of have a… uhm the best analysis possible. [Laughs] So, you know, again, Dr. Johnston can refresh my memory as to precisely what tweaks are made there, but I don't want to state that the only difference is in the results, because there was an opportunity to have a fresh look at the methodology. Fundamentally, the methodology was similar, but they were able to uh tweak the way they were doing things in order to do the best study possible.
DR. JILL JOHNSTON:	Yeah, so the major difference is there where 2055 CAFOS included in the 2014 analysis, and then for the upgraded analysis based on the… the permit list, there were 2029. So, you know, that was a major change for uhm facilities that did not undergo permitting or ones that where their permit expired and we did not have any evidence that they were going to renew their permit. What we tried to do in the 2014 analysis was use this [U/I] available knowledge we had about which uhm… uh CAFOS to include. So we did get some additional information from the state about which ones were not operational, and which ones may have had permits that had dual animals housed there. So, so we did make some adjustments in this first paper, to try to… anticipate uhm what would be included under the demo permit. But in terms of the methodology, the analysis and in the tables provided, are the same. Uhm, we changed the figures a little bit to try to make them look nicer and we also, there were 20 left in counties excluded, and that was using the same criteria as we did before. So there was just one additional uh county that met the criteria.
MARY O'LONE:	Okay. Yeah. Uhm, okay. Well, that was a good explanation. So can we now turn to the… we're going to work from the 2014, 'cause that's what, you know, what we have in front of us. And maybe when you made the changes, some of our questions will be answered. But I just, I wanted to start on page 11 just with Figure 1. And... I have no questions about that one. Now I'm moving on to Figure 2. Okay, so it says the percent of population living within three miles of an IHO in relation to the percent of people of color. Is that the percent of the population in the green study area? Or the...
DR. JILL JOHNSTON:	Yeah, so all of the data and all the tables and figures provided here are uh from the study area.

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MARY O'LONE:	Okay. So Figure 3. Figure 3. So, in the… in the complaint, Figure 3 is described... on page 35 in paragraph 133. There's a-- and I guess the... what… what we are, what we're asking you, Dr. Johnston, is... Well, I guess, do you agree with, that this statement states what your study shows and what that figure shows, I guess?
DR. JILL JOHNSTON:	Can you read the statement please?
MARY O'LONE:	Oh, you don't have it? I'm sorry. It says--
DR. JILL JOHNSTON:	No, I don't have it.
MARY O'LONE:	"As shown in the following figure, which depicts the relationship of industrial swine facilities to the racial and ethnic composition of North Carolina, swine facilities are clustered in communities of color."
DR. JILL JOHNSTON:	Yes. I would agree with that statement.
MARY O'LONE:	Okay. Uhm, we are flipping.
DR. JILL JOHNSTON:	And that's just a note [U/I] actually on the updated reports and here we kind of umh, they have three categories of people of color. Anyway it is displayed uhm more closely to how we conduct the analysis in the updated report.
MARY O'LONE:	What do you mean? I am not sure I understand what you mean?
DR. JILL JOHNSTON:	Like so we actually had like six uhm… six categories that we assigned census blocks into six racial categories. Uhm, and on this map, but its original figure in order to simplify it we just show three categories under 20 percent, or 20 to 40 percent, and then

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	above 40 percent. Uhm…
MARIANNE ENGELMAN LADO:	Uhm, we… that was real hard to hear. Can you say that again?
DR. JILL JOHNSTON:	I'm sorry. So uhm… uhm a mixed figure, the Figure 3… So we have the three categories just that we simplified for purposes of displaying information, which was less than 20 percent, 20 to 40 percent, and greater than 40 percent. Uhm, whereas in the updated figure we show all six categories uhm that we use for our analysis. So it's… it's just a minor point and it doesn't impact my interpretation of it.
MARY O'LONE:	Okay.
DR. JILL JOHNSTON:	But… but just note better what we are discussing the changes between the two versions. That was one we just changed the way we displayed the information.
MARY O'LONE:	Okay.
DR. JILL JOHNSTON:	In the updated version it is Figure 2 on Page 11.
MARY O'LONE:	Yeah. Okay. So now we are moving on to Table 2. Uhm, so Table 2 is there is… it's… table 2 is discussed in a handful of paragraphs in the complaint. Uhm, so I guess I will just read them to you uhm… one at a time. So this is paragraph 132 on page… I don't know what. Wait, 13. Page 13. No, it's not. What I am talking about? 35. It's paragraph 132 on page 35 of the complaint and we are talking about Table 2 on page 13 of the study. Paragraph 132 says analysis of the population statewide yields consistent results. The proportions of African Americans, Latinos and Native Americans state wide living within three miles of an industrial swine facility are 1.4, 1.26 and 2.3 times higher than the percentage of non-Hispanic whites respectively. Table 2, the disparities are also statistically significant. Is that right?

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	Yeah. Table 2.
MARIANNE ENGELMAN LADO:	I would note that that refers to both Page 6 and Table 2 of the report.
MARY O'LONE:	What does?
MARIANNE ENGELMAN LADO:	The paragraph 32 or 32.
MARY O'LONE:	So basically you are sort of quoting Page 6. Is that what you are saying?
MARIANNE ENGELMAN LADO:	I believe so.
DR. JILL JOHNSTON:	Yeah, so that statement uhm, I think, maybe actually doesn't draw on Table 2 that we have shown here which is just for the study area. I think those numbers that you read for uh the whole state?
MARY O'LONE:	Okay.
DR. JILL JOHNSTON:	So state wide analysis where we don't exclude any areas.
MARY O'LONE:	Okay. So which table… so which table should this… or… is this about? Or where are those results displayed?
MARIANNE ENGELMAN LADO:	It's the first paragraph on Page 6.

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MARY O'LONE:	Okay, we calculated--
DR. JILL JOHNSTON:	[U/I] I am not sure if all the tables from the statewide analysis were included in the documents sent to you. Uhm--
MARY O'LONE:	Oh, you mean… okay. So… so the document dated August 29, 2014, Industrial Hog Operations in North Carolina, what you are saying is there is results discussed in the text that aren't displayed in the table or… figure?
DR. JILL JOHNSTON:	Yes. So all the tables in the figures uhm provided in this document are just for the analysis where we restricted it to the study area.
MARY O'LONE:	Okay.
DR. JILL JOHNSTON:	[U/I]. But there was a parallel analysis that didn't restrict… uhm that included all counties [U/I] in the state of North Carolina. And so these results uhm included in the paragraph from Page 6 are from that analysis that uses the entire population.
MARY O'LONE:	Okay. Okay.
MARIANNE ENGELMAN LADO:	And just to draw your attention to paragraph 131 and 132 of the complaint, 131 says analysis based on a study area that excluded the state five major cities in Western County. And it goes on to give the numbers. And then paragraph 132 by contrast says analysis of the population statewide yields consistent results. So paragraph 131 is about the data in the study area and paragraph 132 says it is consistent, but here are the numbers for the state… for a statewide run. Is that correct, Jill?
DR. JILL JOHNSTON:	Yeah...
JERYL CONVINGTON:	So… so 131 again is just for the state? Or statewide?

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MARIANNE ENGELMAN LADO:	Paragraph 131 says the analysis--
	//
MARY O'LONE:	Is the study--
MARIANNE ENGELMAN LADO:	-- on the study area for the state
MARY O'LONE:	Okay.
MARIANNE ENGELMAN LADO:	-- but only the study area within the state. And that is what the tables reflect. Paragraph 132 the very first sentence says analysis of the population statewide yields consistent results. So that's… it's with those numbers 1.4, 1.26 and 2.39 which are the same numbers that appear at the top of the report on Page 6 first paragraph is the statewide numbers not just the study area.
MARY O'LONE:	Okay. So the reference to Table 2 is not because those numbers come from Table 2 but because Table 2… wait. What is it? That is not about, I was going to say--
MARIANNE ENGELMAN LADO:	Directions to Table 2 should probably be like C also. I think Table, uh… I'm sorry, page 6 is the actual support where is Table 2 as uhm Dr. Johnston says seems to be only the study area.
MARY O'LONE:	[U/I]? In the original?
JERYL CONVINGTON:	[Whispering: Well, expiration [U/I] within three miles [U/I] IHS and more than three miles. [U/I] study are [U/I].]
MARY O'LONE:	Okay. So I am sorry, so this paragraph is basically saying that

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	the statewide results are consistent with Table… that the… the proportions are consistent with Table 2, which is about the study area.
MARIANNE ENGELMAN LADO:	Right. Dr. Johnston, is that right?
DR. JILL JOHNSTON:	Uhm, yeah I'm just, okay I'm looking. Yes. Yes. Yeah, I opened up the, I found the document. So Yes. So 131 is the proportion matches what is on Table 2. And then 132 is referring to the statewide analysis of no [U/I] areas, in which… which we did not show the table in this report.
MARY O'LONE:	Okay. Okay. All right now we are going to go to… I think uhm so Paragraph 140 in the complaint I think is sort of a repeat of that. It is the statewide proportion of African Americans living within three miles of an industrial swine facility. Statewide is 1.4 times higher than the proportion of non-Hispanic Whites and that cites Table 2 and page… uhm… Table 2 and page 6. Table 2, page 6.
DR. JILL JOHNSTON:	Yes. I believe that is the uhm that's the same pattern where the one that matches the tables. Uhm--
MARY O'LONE:	Okay.
DR. JILL JOHNSTON:	In this report that is the study area and then 140 goes to the statewide analysis.
MARY O'LONE:	Okay. 142. Okay. So the next paragraph then is 142. We are having the same issue here or the same thing going on. African Americans make up a larger portion… proportion of the population living near industrial swine. Then the proportion of the population living within three miles away from any facility, the disparity… so…
DR. JILL JOHNSTON:	So I believe that uhm [U/I] right, the 20 percent of African Americans compared to 13 percent of non-Hispanic Whites that living three miles of a CAFO?

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MARY O'LONE:	I am sorry. Were you quoting again from Paragraph 132?
DR. JILL JOHNSTON:	Well, weren't you talking about 142?
MARY O'LONE:	Oh, 142. Okay, thank you.
DR. JILL JOHNSTON:	For the uh… [U/I] those arrive at the numbers that I believe that… the reference is appropriate.
MARY O'LONE:	Okay. And the statement is accurate?
DR. JILL JOHNSTON:	Uhm-hum.
MARY O'LONE:	142? Okay. Now we are moving to 148.
DR. JILL JOHNSTON:	Uhm, yeah that's the same as in reference to the statewide analysis.
MARY O'LONE:	Okay. And that's accurate?
DR. JILL JOHNSTON:	Yes.
MARY O'LONE:	Okay. And 1… 150. That's 202? This is a… trying to [U/I]…
DR. JILL JOHNSTON:	Yes. I believe uh… that is correct.
MARY O'LONE:	Okay.
MARIANNE	So… so I'm just saying, I'm just trying to reach back and Dr.

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ENGELMAN LADO:	Johnston, you may remember as well uhm, these references to Table 2, there are different ways of looking at them and one may be that we met kind of… the… the report at 6 provides the information. It's more like a see also Table 2 with consistent results. But… but the other way of thinking and… I remember that there were lots of charts and tables with the numbers and I think and again, Dr. Johnston, you may remember better than I, uhm we may have taken some charts and tables out simply to make it all more presentable because it was kind of too long and too much and if we did uhm could this Table 2 have referred to statewide analyses? I just don't remember if there was another draft with more tables. Uhm, but I seem to have some vague recollection and if so that it means it is kind of a typo but again is also perfectly consistent but you know, we may have just thought it's also supported by Table 2.
DR. JILL JOHNSTON:	I think you are correct that some variation of all these tables included anything from the study area analysis and then a repeat, you know, it may be like… you know, a 2a and a 2b or something I don't know exactly how we laid it out that compared the study area to the whole state analysis. So it could have drawn on that and…
	//
MARY O'LONE:	Maybe… this… this Mary…
DR. JILL JOHNSTON:	And [U/I] exchange, they tried to not have quite as many tables.
MARY O'LONE:	Well I'm… I'm… this is Mary. I am beginning to think maybe it would be a good idea to send all the tables in. Uhm, because I know that, you know, there were some questions here about numbers and stuff so.
MARIANNE ENGELMAN LADO:	Well, we can certainly look for any tables that we have that included the statewide analysis such as the piece here uhm--

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	//
MARY O'LONE:	Because--
MARIANNE ENGELMAN LADO:	-- just to see you know, if we have something. Also, you know as these tables were being developed Dr. Wing and Dr. Johnston may have gone back to the data and you know, and found that there was a mistake when we include [U/I] permits or we included something else that had to be cleaned up. So I don't want to send over stuff that isn't correct, isn't final. Right? But uhm… because… because they worked on this and as I said before there was a lot of work going into uh refining the data and then refining the methodology. So but we can look to see if there were… I do… I do have a recollection that we may have had some near final tables that uh might have included the statewide data and we just thought it was too much. So if we have that we can certainly send that over and we will look for that. I will put a star next to that as a "to do."
MARY O'LONE:	All right. Thanks. And just asking, so the tables they will have headers on them, they're descriptive like the ones that are here. So Table 1 is--
MARIANNE ENGELMAN LADO:	I am not sure we are looking for a totally free standing table or as Dr. Johnston said it may have been this table with an additional column and we just thought it was too confusing to have all of that information in one time. It's that kind of thing, so uhm, so it would have a header and you know, if it were in the near final version but I just don't, you know, it's a couple of years ago and uhm by the time the revisions came along it was more like using the 2014 version as a base so some of these questions weren't revisited again. So it was two years ago and, and uhm… I'd have to look back and, you know, and confer with Dr. Johnston. But I think there may be something that we can send over to you with the statewide data.
DR. JILL JOHNSTON:	Yes. We may have to uhm… format I am not sure all the information ended up in this final format but uhm, but the… but the [U/I] there were data available.

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MS. ENGELMAN LADO::	Okay. All right. So turning back--
MARIANNE ENGELMAN LADO:	Just to be clear as I read this and… and Mary you can correct me if you are looking for something that I am not thinking about or Dr. Johnston, correct me if I am wrong about this but this data is actually in… on page 6. It's just that it is not presented in you know, in Table 2 as a reference from Table 2 and that is what is confusing. So if we can find that so it… I'm happy to do that. It doesn't… Dr. Johnston, does it uh does it change any of your conclusions or is there anything different or new about that data?
DR. JILL JOHNSTON:	No. I think it is consistent with, with what we uhm with the tables that we show and you know, the numbers on the text and what seems to be on this complaint form uhm are correct.
MARY O'LONE:	Okay. So you know, we wanted to, I'm looking here at the clock. I's 5 after 4 but we wanted to you know, mark through sort of some of these paragraphs to have you, you know, do what you are doing so far and saying yes, that is an accurate characterization of this table. And then, you know, after that we have a handful of other questions. Uhm, but I'm wondering if there is an easier way to do this than just doing it on the phone here. Uhm, so that we can move on to the other kinds of, the other questions that we have. Did you, Dr. Johnston, did you write… did you write these paragraphs that are in the complaint and or did you… and/or did you… did you write them? That is the first question.
DR. JILL JOHNSTON:	No. I did not write them.
MARY O'LONE:	Okay. Did you review them all before they you know, came to EPA?
DR. JILL JOHNSTON:	I reviewed a version of them. I can't say whether it was a final version or not.

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MARY O'LONE:	Okay. Yeah. Here is what I am trying to do. Marianne, and I think you are probably trying to see what I am trying to do here. I just want to make sure that uhm… that… that she's, that Dr. Johnston, so she didn't write it. That… that she does agree with what it says. And that's all I am trying to do is make sure that now when we use it, you know, when we… if we are going to use the language here that is, that we can adopt it. I am just trying to cross that T here.
MARIANNE ENGELMAN LADO:	Let me propose this uhm since Dr. Johnston-- we didn't know that this is what you were going to do and Dr. Wing also reviewed these uhm these paragraphs uhm and like you know, we may have… we may have six typos after [U/I] reviewed it, he… he definitely reviewed the final version. Uhm, but perhaps since we didn't expect this line of questioning uhm, and Dr. Johnston has a copy of the complaint after this phone call, either… if you can identify which paragraphs you want her to review.
MARY O'LONE:	Sure.
MARIANNE ENGELMAN LADO:	She can look at them and we can follow up and if there are any points of divergence of course Dr. Johnston should say so uhm on those paragraphs. But why doesn't she have time to review them and… and she can get back to us.
MARY O'LONE:	Yes. I think that is more efficient. Okay. Then--
MARIANNE ENGELMAN LADO:	Is that okay with you, Dr. Johnston?
DR. JILL JOHNSTON:	Yes. I can do that.
MARY O'LONE:	Okay.
MARIANNE ENGELMAN	Which paragraphs is it or are... you wanna email them?

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LADO:	
MARY O'LONE:	We are going to email it. Yeah. We'll have to email you the list. Okay. The next question I think we've already gone it… it hasn't been pub-- the study has-- now we are moving off the, you know, nitpicky thing and moving into more general questions so the study hasn't been published and you are checking, Marianne, on whether it was provided to DEQ.
MARIANNE ENGELMAN LADO:	Yep.
MARY O'LONE:	Okay. And I don't think we need to ask the next two. Do you know if this has been made public in any other way?
DR. JILL JOHNSTON:	I believe that on uh EarthJustice website.
MARY O'LONE:	On the EarthJustice website?
DR. JILL JOHNSTON:	[U/I].
MARY O'LONE:	Okay. Then maybe I will ask my next questions. Are you aware of any response or criticism or critiques of the study, you know, that are out there?
DR. JILL JOHNSTON:	I am not. And Dr. Wing hasn't shared any with me if he's reviewed something.
MARY O'LONE:	Okay. Marianne, have you?
MARIANNE ENGELMAN LADO:	I am thinking. To be… to be as… as uhm complete as I can but I'm racking my brain and I… I don't think I have received any critique or response to the disproportionality analysis.

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MARY O'LONE:	Okay. Well you know, if you do come across anything let us know. Okay ne-- now I wanted to talk about the 2000 study and mainly it's the differences between the 2000 study and the 2014 study. And, you know, sort of why those changes occurred if you know the answer. So… one of the changes was--
MARIANNE ENGELMAN LADO:	I am sorry before we go into that.
DR. JILL JOHNSTON:	Yeah!
MARIANNE ENGELMAN LADO:	Alexis just pulled up the uhm our website and it looks like the disproportionality analysis is available through our website. Oh, or on our website? Where? North Carolina Policy Watch.
MARY O'LONE:	Okay.
JERYL CONVINGTON:	Complaint or the study?
MARIANNE ENGELMAN LADO:	The study.
JERYL CONVINGTON:	Okay. Good, okay.
MARIANNE ENGELMAN LADO:	Okay, I don't know if you heard that. The 2014 analysis seems to be available on North Carolina Policy Watch. We just… also so you know, this is a little bit of an-- of an aside from this interview but we have not generally made available the declaration uhm to the press or other people. We… we in general when we have gotten inquiries we will call the [U/I] that might have information responsive to an inquiry and ask whether it's okay if we share their declaration even for people who did not ask to have their

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	information anonymous, submitted anonymously, and as you know there was… that… there was… that category as well but we are, you know, respectful of people's uhm [U/I] and concerns about retaliation so we are very careful not to just throw everything up on the website. And that doesn't run to the disparities analysis but we haven't just put all of the exhibits up on our website or in any other place so… that… that's part of the backdrop as to why I'm not clear as to where we sent what.
MARY O'LONE:	Okay. Did North Carolina Policy Watch just pick this off of your website? So I'm wondering, you said you haven't received any critiques. I guess I am wondering or criticism or, you know, any--anything not off the wall. Could it have gone into North Carolina Policy Watch?
ELIZABETH MCLAUGHLIN:	This is Elizabeth. North Carolina Policy Watch picked up the complaint from the center's website. And I'm not recalling any discussion that I had with them uhm but it would not surprise me at all because they 're… they are investigative journalists that they would dig into studies referencing the complaint and share those with the public. And so that is the 2014 study uhm… I mean with not confidential… it is not surprising that they listed it on their website.
MARY O'LONE:	Okay.
MARIANNE ENGELMAN LADO:	And Dr. Wing may have been talking to the members of the public and providing copies if it wasn't confidential.
MARY O'LONE:	Okay.
MARIANNE ENGELMAN LADO:	I am pretty sure that they had also posted the 2000 report along… along how many years ago.
MARY O'LONE:	Right.
MARIANNE	So it could be also that they just think that's Dr. Wing's work so.

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ENGELMAN LADO:	
MARY O'LONE:	Do you have a relationship with them or do they just pick your stuff up and they put it up there? Because what I'm wondering is whether they were on the receiving end of anything legitimate as far as the critique.
MARIANNE ENGELMAN LADO:	I do, we do have a relationship with them uhm, a cordial relationship with them so we could find that out if you are interested in it or…
MARY O'LONE:	Yes. We, you know, are interest-- we are interested in it. I mean we are going to look too but we don't know what, you know, if they are going to curate their site or what happens. So we would be interested if they happen to have anything. Okay.
MS. ENGELMAN LADO::	We'll find out.
MARY O'LONE:	Okay. Sure. Great. Thank you. Uhm, okay so circling back, Dr. Johnston, to the 2000 study and some of the changes in the methodology from that study to the 2014 study. One of the things that was discussed in the 2000 study had to do with well water. And looking at those that were… yeah, somehow including those and now I can't remember because I'm… I'm looking for it now uhm that that was taken into account but that wasn't discussed in the 2014 study.
DR. JILL JOHNSTON:	Well uh my understanding in this report they looked at sort of three different vulnerable populations. One being racial and ethnic minorities. One, uhm, you know looking at people living in poverty. And the third, looking at people who relied on well water.
MARY O'LONE:	Right.
DR. JILL JOHNSTON:	So being that all three variables were not included in one model that they were sort of three parallel analyses that looked at the

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	correlations between those different characteristics of the population and proximity to [U/I] CAFOs.
MARY O'LONE:	Okay. And the well water component wasn't done in 2014. Do you know… is there a reason--?
DR. JILL JOHNSTON:	Uhm. Yeah, I mean specifically we can prioritize looking at racial and ethnic disparities in that analysis. Uhm, and just this limited capacity focused specifically on that issue but also for the 1990 census included information about people's drinking water sources. But to the best of my knowledge that was the last census that included that data, so if we wanted to look at data in uhm… you know, on the… in the 2020-- sorry, the 2010 census. They did not include questions asking about drinking water.
MARY O'LONE:	Okay. All right. Great. Thank you.
MARIANNE ENGELMAN LADO:	If I could, this is Marianne. If I could interject. Uhm, so because this was not a general study for the general public but a study to test whether there was a racial disparity related to the general permit, uhm the request was to examine that question: whether there are disparities in terms of race and ethnicity. So you know, there is a difference between doing a study uhm you know, for the general inquiry of you know, uh a vulnerable populations and the relationships to CAFOs and looking into the relationship on the base of race and ethnicity and whether civil rights were violated. So it was really a question as to whether or not there was a disparity recognizable under the civil rights law that you know, that Dr. Wing and Dr. Johnston generously took up. That you know, that… that's a big part of it here.
MARY O'LONE:	Okay. Yes. I understand what you are saying, Marianne. So the next question has to do with the distance and we talked about it a little bit earlier. I think the 2000 study did one in two mile buffers uhm… and now this one goes to three. So can you sh-- can you… and the next one has to do with… the next question I have has to do with the measurement. The idea of moving off the buffer zones around the set… the block group area to using the centroid. So maybe it is all related but if you could explain that.

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DR. JILL JOHNSTON:	Yeah. For me the difference between the sort of spatial approach that we took, we made two different reports. Is in the 2000 report they relied on block groups. And so here there was a little over 4000 block groups included every region in the study area. And so with our report we have over 200,000 blocks in our study areas, so the size of the blocks and the size of the block groups are very different uhm especially in rural areas because they sort of… [U/I] to have you know, similar types of population in terms of count in these different census like geographic areas, and so rural areas as a block group tend to be very big and so they were looking at… the… the principal analysis in this 2000 report wanted to see if there was any CAFO in the blocks group. Uhm, and then after a sensitivity approach because, you know, you can have a CAFO right in the corner of the block group and so that could impact its neighboring block groups as well or a portion of that population. So as a sensitivity approach they also sort of looked at sort of one mile around the block group and then two miles around the block group. And it included you know, the category of whether or not it was near a CAFO, uhm were the [U/I] based on those parameters. Uhm, so in contrast when you look at blocks I don't remember the exact number but you know there is a little over 2000 CAFOs in the state so if we were just to find exposure based on whether there was a CAFO in a block you know, that went down to like fewer than 1000 blocks. Because it is just much smaller. And so for this analysis in… when you are using blocks as your unit of analysis then you need to consider, uhm it really it's important to consider a buffer zone around it because we know how chemicals can travel sites. And so, you know, using evidence, a lot of papers that have been published since 2000… uhm, we put a… relied on a three mile buffer uhm for the 2014 report. But that is the… the… the spatial scale of the two are just very different and so that's partly the difference in what kind of buffers were considered.
JERYL COVINGTON:	Let me ask you once, and this is Jeryl. So, I… I'm understanding that you all looked at the block group and you are still considering I guess the travel, the air emissions of H2S. You all did an overlay on this one as well to come up with that distance?
DR. JILL JOHNSTON:	On the 2000 report?
JERYL	Yes.

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COVINGTON:	
DR. JILL JOHNSTON:	So in terms of one and two mile buffers I cannot specifically speak to.
JERYL COVINGTON:	Okay.
DR. JILL JOHNSTON:	Uhm, and I believe the data presented here in the tables uhm, specifically include the buffer zone, but that was used as uh… a sensitivity analysis so if we included these buffers or changed our definition of exposure with the patterns that need to be changed. And from my understanding of this report you know, the patterns were consistent but I believe the tables show… uhm rely on the definition of that block group it [U/I] if there's a CAFO in that block group.
JERYL COVINGTON:	Okay, I'm gonna to repeat that. So you are saying the block group is exposed if there is a CAFO in that block group?
DR. JILL JOHNSTON:	Yeah. That was the primary definition of the analysis from my understanding in this 2000 report.
MARY O'LONE:	And the one and two mile buffer around the block group… was not that populations were measured one and two miles outside that… block group but for some other reason.
DR. JILL JOHNSTON:	[U/I]. Yeah. So let's say… so, perhaps there would be no CAFO in a block group.
MARY O'LONE:	Okay.
DR. JILL JOHNSTON:	And if you do a one mile buffer around it there would be a CAFO, so and in that condition you would include that block group as if population was exposed to a CAFO. Uhm… and I never [U/I] I assume because it is a block group that's using like around-- one mile around the buffer rather than one mile around a centroid.

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MARY O'LONE:	Yeah.
JERYL COVINGTON:	Because you know, block groups are so much bigger so we wouldn't get much outside the border from that definition.
MARY O'LONE:	Dr. Johnston.
DR. JILL JOHNSTON:	Yeah.
MARY O'LONE:	Just to… just to make sure I have it uhm and is clear. When you say you would include that CAFO that is in the buffer up to two miles away in exposure that would be in the sensitivity analysis but not in… I don't know what you call it… but the core analysis?
DR. JILL JOHNSTON:	Yeah. That's how… you know, I don't want to say 100 percent because I did not make these tables but as I uh read this paper and see how I understand the data presented is uh… they are not using the buffer definition. They're just using the category of whether or not there is any CAFO inside the block group.
MARY O'LONE:	Okay. Okay. Anybody else? Alright, so the next question and Marianne, I think this probably goes back to what you already said but… why was poverty omitted this time?
DR. JILL JOHNSTON:	Yeah, I think it goes back to the same point is that we were looking at criteria that were considered under the Civil Rights Act.
MARY O'LONE:	Okay.
DR. JILL JOHNSTON:	And so, you know, poverty not being one of those classes considered, we didn't include it in the analysis.
MARY O'LONE:	Okay. Are there any other differences that you by chance know about between the 2000 and the 2014?

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DR. JILL JOHNSTON:	Yeah. I mean… you know how we assigned which people were exposed. [U/I] this analysis include commercial CAFOs in the state of North Carolina whereas the 2014 we were restricted to those CAFOs that are covered under the general permit that did not include those under the individual permit or under [U/I].
MARIANNE ENGELMAN LADO:	Okay. Can you, Dr. Johnston, explain what you mean by how the… how people are assigned. Are you referring to the use of quintiles and can you explain what the significance of that is?
DR. JILL JOHNSTON:	Yeah. [U/I] here, you know, it was… you're considered to be exposed to a CAFO if you lived in a block group with a CAFO, you know, whereas in our… in our 2014 report you are considered to be exposed to a CAFO if the centroid of your block is within three miles of a CAFO.
MARY O'LONE:	Right.
DR. JILL JOHNSTON:	But yes, here after we uh… the… we took a similar approach to using the categorical variables to account for non-linearity in the relationship between you know, the racial composition and proximity uhm… current exposure to CAFOs, but in the 2000 analysis they divide the groups so that in each of the five groups there is an equal number of block groups in it. So that is how they defined their cut off points. So for example like, the… lowest quintile, you know, of 2.3 percent uhm, the highest quintile is more than 44 percent people of color. Whereas in the updated approach we used partly just uhm… because we thought it was a little bit more intuitive and easier to understand we categorized uhm the percent people of color into equal… like, equal percentages. Uhm, so our reference group was zero percent people of color because there was a high percentage of population where they lived in blocks with no people of color and then divided it from you know, more than 0 to 20, 20 to 40 in those groups of 20 percent uhm, because it… it's a little bit… as in easier to communicate uhm rather than having to talk about, you know, this quintile versus that quintile. Uhm, and also because we are able to look at, uhm… you know, these… has this block [U/I] majority of people of color.

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MARY O'LONE:	So Dr. Johnston, the… just to follow up on that, so that if you had used quintiles it would have… would you… it would have been difficult to say anything meaningful about the effects of living in a over 60 percent versus living in over 80 percent people of color community but using your methodology you could get more granular on that basis. Is that right? I didn't hear the answer.
DR. JILL JOHNSTON:	I'm sorry. Yes, that is correct.
MARY O'LONE:	Okay. Okay. Anybody else have any other questions? Comments? So the 2000 study uh… and you may not able to answer this. But are you aware of any criticism of that study? Because I think that… was-- wasn't that submitted in one of the general permit processes? So I'm wondering if it got more play in the outside world and, you know, what reaction there may have been to that that you are aware of. Critiques or anything?
DR. JILL JOHNSTON:	[U/I] it was published in [U/I] House Perspective? [U/I] you know, a high quality journal in environmental health [U/I] sent through the peer review process, uhm but I can't speak to any critiques of it.
MARY O'LONE:	Okay. All right. See where are we now? Uhm, we're… close to wrapping up here. We have a general, well one… one last… one question here is the generic one that all experts get asked and you probably see it on TV which is the, you know, were you compensated for doing this study?
DR. JILL JOHNSTON:	No.
MARY O'LONE:	Okay. Uhm, then the other question I have, I heard somebody laughing. Uhm… uh… we're wondering if you had worked with Dr. Wing on any other uh studies related to swine and… in swine farms in North Carolina?
DR. JILL JOHNSTON:	Well, I worked with him and also uhm Dr. Getjay [PH] around an analysis of hydrogen sulfide concentration near middle schools in

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	Eastern North Carolina, which was recently published.
MARY O'LONE:	Okay. I think that was in your CV or was referenced in your CV. Is that right?
DR. JILL JOHNSTON:	Yes.
	//
MARY O'LONE:	Do you-- ah…
MARIANNE ENGELMAN LADO:	And I was just going to interject here that that work and… and Dr. Johnston's experience working on studies generally community based [U/I] studies and other work in the community on which she might give some opinions about adverse impact of swine CAFOs could be subject to another interview as we kind of went back and forth on. Uhm that wasn't kind of the premise--
	//
MARY O'LONE:	Right.
MARIANNE ENGELMAN LADO:	-- of interviewing with you but she has generally said that you know, if she knows in advance she'd be more than happy to talk to you about that body of work and the research associated with it.
MARY O'LONE:	Okay. That would be great. Did the hydrogen sulfide study get submitted with the materials you sent in April, Marianne?
MARIANNE ENGELMAN LADO:	Yes, it is the study that is… it was… it was confidential at the time but it has since been published.
MARY O'LONE:	Okay.

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MARIANNE ENGELMAN LADO:	So it is… it is in exhibit but it also says it is confidential.
MARY O'LONE:	Okay. So…
MARIANNE ENGELMAN LADO:	It was prepublication at that point.
MARY O'LONE:	Okay. We have a… I'm trying to fin-- do we… can you send us the publication copy just to make it easy?
MARIANNE ENGELMAN LADO:	Yeah.
MARY O'LONE:	For us, the… the published version? That would be great. Uhm, let me think did we have any other questions right now? [U/I]? I don't think so. Okay. Is there anything else that you wanted to add, Dr. Johnston?
DR. JILL JOHNSTON:	Uhm, no. No, I don't believe so I think if you had a chance to review our updated report then I am happy to answer any questions or offer any clarifications related to that but it… but it… but [U/I] are pretty parallel structure to what you have. We just refined which CAFOs were included in the analysis.
MARY O'LONE:	Okay. And so, yeah and I'm kind of thinking, Marianne, since I haven't had a chance to look at that you know, how we wanted to send you the paragraphs that we wanted to do I have a feeling we are going to have to… we have to fix it because we have to switch it now to the… to the newer study. So does the newer study… what you submitted, Marianne, is it going to include, is it just a new study or do you have a cover letter that is like the complaint that goes through and, you know, here is the… here's layman's, you know, description of what is in this report?

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MARIANNE ENGELMAN LADO:	It is a little bit of a hybrid in the sense that we have a complaint and we are filing additional submissions--
MARY O'LONE:	Uhm-hum.
MARIANNE ENGELMAN LADO:	-- in support of the allegations in the complaint. We don't amend the complaint and say this goes to Paragraph 132. We rather are just submitting additional documentation in support of those allegations. So there is a short cover letter but it is not… it's not lengthy and, you know, it doesn't go into which paragraphs that it supports.
MARY O'LONE:	Okay. Okay.
MARIANNE ENGELMAN LADO:	The other thing I was thinking might be useful since we are ending a little bit early which is good, is just to say a little bit more about Dr. Johnston's experience and, you know, and background and expertise on methodological issues uhm, and you know, and courses taught or research done or… you know, you have her CV and I think uhm Jeryl Covington asked some questions earlier on, uhm but if you have any questions about that or I would just open it up to Dr. Johnston to say about a few more words about whether you have taken any courses or have any special training or expertise on methodology in epidemiology… that would help.
DR. JILL JOHNSTON:	Uhm, yeah. For both a starting point this… you know, this is not submitted through the peer review process but uhm every publication that I have now offered for the American Journal of Public Health that sort of uses a similar approach to racial disparities analysis is around a different topic looking at waste water uhm, [U/I] in south Texas but not related to industrial animal operations. Uhm, but you know, went through the peer review process used [U/I] level data and a very similar approach to that. So that is uhm, you know, some of that sort of expertise and credentials in the peer reviewed literature that… that is a similar method to what we are doing here in this paper. You know, but also yes, I mean I do have fairly extensive coursework in these different types of regression modeling, epidemiological study design and also just quantitative data analysis processes

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	like [U/I], you know in biostatistics and epidemiology and also in econometrics. Uhm and… and then yeah, had a two year post doctoral fellowship uhm in environmental epidemiology and [U/I] taught a class with Dr. Wing, specifically on community based epidemiological methods and environmental justice.
MARY O'LONE:	Okay. Well thank you. Actually that was helpful particularly the reference to west Texas or the Texas wastewater.
	//
DR. JILL JOHNSTON:	And I also [U/I] an article uhm, and I can send it to you uhm that's also included in my CV and… yeah, it may be helpful I uhm… I did do some critiques on that from the oil industry but nothing that was really methodological driven. Uhm… but yeah, that can uh… it's a reference in the peer review literature that takes a very similar approach to how to analyze data in a racial disparities analysis as this one does.
MARY O'LONE:	Okay. Is it… is it easy for you to send us that report too? Because I think that would be helpful and then--
DR. JILL JOHNSTON:	Yes. And [U/I] send it to Marianne and then… in her package she can share it with you.
MARY O'LONE:	Great. And the oil and gas industry uh… comments or response or whatever you want to call it, uhm… how… like, what form did that take?
DR. JILL JOHNSTON:	It came out of a report that was shared with me.
MARY O'LONE:	Can you, would you be willing to share that as well?
DR. JILL JOHNSTON:	Yeah. Let me… let me review it but uhm…
MARY O'LONE:	Okay.

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DR. JILL JOHNSTON:	But probably…
MARY O'LONE:	Okay. Did anybody else have any questions at this point? Okay.
MARIANNE ENGELMAN LADO:	We… we have some follow up. We have something to give you, we'll wait for your list of paragraphs as well and exchange information and then it sounds like on… on the… uhm, the follow up report that was submitted this year as well as the more recent study as well as other studies we worked on the adverse impacts we should schedule another interview time and uh… we can try to do that relatively quickly, I think, if you'd like. So let's try to get that all underway.
MARY O'LONE:	Yes. I think we'll have to get back to you on that.
JERYL COVINGTON:	Yeah, Marianne, what I have identified so far is that you will sending after your review the background, the statewide study so that we could correlate the tables and the statewide data that you have in the reports. We will follow up on whether the questions for the paragraphs are relevant. We need to review the data that you just sent to us in April 12, 2016 to see if those questions have been answered so we'll to have to review that email. And I did receive those email submissions. So let us look at that and then we'll coordinate amongst ourselves on the follow up interview with Dr. Johnston and yourself.
MARIANNE ENGELMAN LADO:	Sure. If you could send me some dates. I think what we said on the statewide data is if there are final charts, again I think it is just a reference problem in the complaint to this Table 2.
JERYL COVINGTON:	Yes.
MARIANNE ENGELMAN LADO:	If there is another Table 2 with the statewide data or another table with the statewide data or another column in an earlier draft that is, you know, sufficiently well along I… we'd be happy to send it to you.

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JERYL COVINGTON:	Okay.
MARIANNE ENGELMAN LADO:	But uhm we will… we'll look for that and get back to you on that.
MARY O'LONE:	Okay. And then the follow up we did receive in the April 12th submission the Gentry Report that is marked confidential and I think you are going to submit that after publication without the confidential reference to it?
MARIANNE ENGELMAN LADO:	Correct.
MARY O'LONE:	And then Dr. Johnston is going to do the supplementary information on the oil and gas disparity analysis literature to you and then you'll subsequently submit that to us.
MARIANNE ENGELMAN LADO:	It will be the publication as well as she is going to review the feedback to see if it is appropriate to [U/I].
MARY O'LONE:	Right.
MARIANNE ENGELMAN LADO:	Terrific. Okay. Thank you.
MARY O'LONE:	Okay. I think that is it for now. Is that it?
MARIANNE ENGELMAN LADO:	Okay.

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MARY O'LONE:	All right. Thank you very much. Thank you, Dr. Johnston.
DR. JILL JOHNSTON:	All right. Thank you.
MARY O'LONE:	Okay. Bye, bye.
JERYL COVINGTON:	[U/I] hit star two [U/I] last recording.
DR. JILL JOHNSTON:	No!
MARY O'LONE:	Are you serious?
JERYL COVINGTON:	Uhm-hum. You gotta hit star two.
MARY O'LONE:	I thought it had [U/I] because I did hit star two to record [U/I].
JERYL COVINGTON:	[U/I].
MARY O'LONE:	Jesus Christ! Can we call and get them to do something?
JERYL COVINGTON:	Yeah.
MARY O'LONE:	Because we need this transcription because I stopped taking notes and [U/I] because [U/I] is all there.
JERYL COVINGTON:	[U/I].

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	[END OF RECORDING]

EPA

Moderator: Jonathan Stein
June 7, 2016
1:54 p.m. ET

Operator: This is Conference # 163166159.

(Ericka): Hello.

(Marianne): Hi, it's (Marianne) (inaudible) and (Alexis Andiman) from (Earth Justice).

(Ericka): Hello (Marianne) and (Alexis). This is (Ericka Farrell) from Title VI (OCR).

(Marianne): Hi there.

(JerylJeryl): This is (JerylJeryl Covington) with OCR.

(Johanna): Hi, this is (Johanna Johnston) from (OGC). I believe we're just going to wait a couple more of more minutes. We're waiting for somebody else to join us on our side. Is Dr. Wing on the phone?

(unknown): Not yet.

(Ericka): OK.

(Elizabeth): Hi, it's (Elizabeth Haddock) at the Center for Civil Rights.

(Ericka): Hi (Elizabeth), this is (Ericka Farrell) from the Title VI OCR office and then we also have (JerylJeryl Covington) and (Johanna Johnston).

(Elizabeth): Great, great. Hope everybody is well.

(Ericka): Yes.

(Marianne): Hello (Liz) it's (Marianne) and (Alexis).

(Elizabeth): Hey there.

(Marianne): We just received a quick note.

(UnknownEricka):Hello.

Steve Wing: Hello, this is Steve. Sorry for being a few minutes late.

(Elizabeth): Hey Steve, it's (Elizabeth) and (Marianne) and (Alexis) are on too.

Steve Wing: Oh, so we're waiting for?

(Elizabeth): I think EPA's on as well EPA.

(Ericka): They're on yes. Hi Steve.

Steve Wing: Hello.

(ErickaEricka): So we have folks who will introduce themselves in the office of civil rights and the office of general counsel. I think they were also waiting for one more staff member from the office of general counsel.

(Johanna): OK. I think EPA's (also) here now too.

(Ericka): OK, great.

(Johanna): Do you want to?

(Ericka): OK. So is Dr. Wing?

(Johanna): Yes, he joined us.

(Ericka): OK, good afternoon everyone. Again this is (Ericka Farrell) from the office of civil rights with the U.S. Environmental Protection Agency in Washington D.C. and thank you for taking the time to talk with us. And as you know the office of civil rights is investigating whether North Carolina Department of

Environmental Quality I'm sorry, regulation of swine feeding operations discriminate against African Americans, Latinos and native Americans on the basis of race and national origin and neighboring counties and violate Title VI in EPA's implementing regulations.

And just so that you know, this interview will be recorded. And for the record Dr. Wing, can you please provide your full name?

Steve Wing: My full name, Steven with a V, Bennett Wing.

(Mary): And can we – this is (Mary O'Lone) from EPA office of general counsel. Can we just go around and say all who's on the phone before we sort of launch in here? So this is (Mary O'Lone) from the office of general counsel at EPA and we'll go around the room here.

(Johanna): Hi, this is (Johanna Johnston). I'm also from general counsel at EPA.

(JerylJeryl): This is (JerylJerylCovington) with the office of civil rights at EPA.

(Ericka): And again this is (Ericka Farrell) from the office of civil rights Title VI office.

(Mary): (Marianne), you want to do your group?

(Marianne): Sure so I'll start. It's (Marianne Engelman Lado) and I'm with Earth Justice. (Alexis)?

(Alexis): (Alexis Andiman) also with Earth Justice.

(Marianne): And (Elizabeth).

(Elizabeth): (Elizabeth Haddock) at the UNC Center for Civil Rights.

(Brad): (Brad Dusham) also at the Center for Civil Rights.

(Ericka): OK, that's it.

(Mary): And then Dr. Wing. OK yes.

(Ericka): OK. Now again Dr. Wing could you provide us your professional contact information specifically your office address, office telephone number and office email.

Steve Wing: Yes. My address is department of epidemiology campus box 7435 University of North Carolina Chapel Hill, North Carolina 27312. Phone, 919-966-7416. Email, (steve_wing@unc.edu).

(Ericka): Thank you. And we're going to start with a line of questioning.

(Mary): So this is (Mary O'Lone) and I wanted to say you know thank you Dr. Wing for making yourself available for the interview and that you know if at any time you need to take a break or we need to break just let us know and we'll do that. And then also if we need to end early and you know reschedule or whatever we'll make whatever accommodations we need to.

Steve Wing: Thank you.

(Mary): But we very much appreciate you making yourself available. So we're going to start off with some quick sort of one off questions and then get into more of a general conversation as we go on. The first question was just was – is have you ever conducted any research that was funded by the pork industry?

Steve Wing: No I have not.

(Mary): Have you ever conducted any research on behalf of the North Carolina legislature such as the environmental review commission or any part of the North Carolina legislature?

Steve Wing: No I have not.

(Mary): OK. And this is just a general question about your research. So we see you know we see that you've focused on the swine industry and I'm just sort of wondering if you could give us a little background as to why not all cases in North Carolina but you know why you focus on swine.

Steve Wing: Well I was introduced to the problem in 1995 when I began to meet residents of eastern North Carolina who were impacted in their neighborhoods by swine

operations. So I followed and I researched. I learned early on that there were – there was quite a bit of research about the swine confinements the new liquid waste management systems. But it was almost entirely about the engineering of the waste pits and the spray fields, animal nutrition, veterinary practices and so on and there was not any literature on environmental health impacts.

And because the residents that I met believed they were being most affected by the swine industry and keep in mind this is 20 years ago, I decided to focus on that. The poultry industry had not expanded as much at that time as it has now. Also because of the engineering waste management practices the liquid waste systems I believe had more potential for impacting neighbors than the dry (litter) system that most of the turkey and chicken operations use.

They are not benign but at the time I began it appeared to me that the swine operations were more important and furthermore they had developed very rapidly. The number permitted had increased very rapidly. And one of the other – one of the other issues that was brought up repeatedly by the residents that I met was that these facilities were disproportionately placed in communities of color. So it was that combination of issues that led me to focus on the swine operations.

(Mary): I have a question about you know the increase in the number of swine over time and I have to be – I have yet to figure out the answer to it and I'm hoping maybe you can help me. So in your declaration you say that between I think it was the early 80s and 2007 the number of swine increased from 2 million to 10 million. And then we also see that there was a moratorium on the expansion of swine facilities and you know permitting of new facilities between '95 and 2007. And I've been trying to figure out if there's you know when I read the sort of plain language of what is a moratorium and no expansion and no new ones how the numbers of pigs jumped.

Steve Wing: The expansion was primarily during the period of between the early 80s and 1998. Thereafter the numbers fluctuate. There were some facilities that had applied for permits before the moratorium that weren't able to open but for the most part the growth was between around 1980 and the late 1990s.

(Mary): OK, all right. Now we have some specific questions regarding the disparity studies and then after that we're going to just sort of focus on your interaction with North Carolina DEQ and the swine regulatory – the swine waste regulatory process. But we had a specific request about the October 19th, 2015 update. And you know we read that you had basically cleaned the coordinates you know to make sure that you had the right ones before you did the analysis. And we were wondering if we could get – if we could get those coordinates and any information you have describing the changes that were made to the North Carolina coordinates and the reasons for those changes.

Steve Wing: Definitely. I'm you know I haven't done the programming myself but I can contact either (Jill Johnston) or one of the research assistants at UNC and we can provide that to you.

(Mary): OK that'd be great. We have spoken to – we spoke to Dr. (Johnston) I'm sure (Marianne) told you and she was able to answer some of our questions about the 2014/2015 study but we still had a couple that we would like to ask you. And you know part of this is just – a lot of it is us we're not epidemiologists, trying to get a firm grasp on how we articulate to policy makers within EPA and those that we have to talk with. You know being able to explain in very plain terms what your study says and you know what it means.

And one of the – one of the questions that we have is just about getting a grip on the methodology that's used to count people in the two studies, in the one you did in 2000 and in the 2014/2015 study. And we were trying to figure out different ways to you know have you help us. And I think what we came up with we thought might be the easiest would be for the 2014/2015 study would be to look at table four and just you know march us through the numbers. Do you have it in front of you by any chance?

Steve Wing: I'm looking at table four right now from the updated study.

(Mary): From the – right. So it's at the top of page 14, right. Make sure we're talking about …

Steve Wing: That's right.

(Mary): OK.

(Elizabeth): Can you hold on just a second? I'm just pulling it up as well.

(Mary): Sure, sure.

(Elizabeth): So this is from the 2015 study?

(Mary): Yes, the 2015 study.

(Elizabeth): OK.

(Mary): And I was hoping this would help us you know just sort of generally march through how it's done because I have read and reread it the study and just tried to figure it out and it's me. (I'm not sure). I just have a, I have a tough time processing this kind of information. So in the first column the percent people of color, what you're – that is the, that represents of – tell me what that – tell me what that represents there, that column?

Steve Wing: OK. So the first column percent POC are the ranges of percent for census blocks. So there are if you look at the first and second columns, there are 559,000 179,000 people who live in census blocks with no people of color.

(Mary): And the census blocks are – the census blocks that you're counting are those that have a centroid within three miles of a CAFO, right?

Steve Wing: No this is in this case this is all the census blocks in the study area.

(Mary): All the census blocks in the study area, OK.

Steve Wing: So the sum of the column population yields the total number of people in the study area. Because everyone in the study area lives in a block that either has no people of color or has less than 20 percent, 20 to 40 et cetera up to 80 to 100 percent people of color.

(Mary): OK. And to get into the study area you had to be a census block that had a CAFO in it?

Steve Wing: No, that's not the case. The study area was defined as the whole state minus …

(Mary): OK, right.

Steve Wing: The five major cities and the western counties which have no permanent CAFOs either in those counties or an adjacent county.

(Mary): OK and these are all …

Steve Wing: And that's we made following the work we had done previously that had been peer reviewed.

(Mary): Repeat that. I think I interrupted – I was going to interrupt you but so.

Steve Wing: The decision about how to define the study area mirrored the decision we made in our 2000 publication.

(Mary): Right, OK. OK, so this is – these are the populations in the study area, OK. So then the ratio's comparing the percent of people residing within three miles of an (IHO) in blocks with people of color compared to blocks without people of color?

Steve Wing: No, that means that there's a – what we have is the population of each of the categories the percent people of color that lives within three miles in a census block within three miles of an (IHO) divided by the total population give the percent of people in that group that live within three miles of an (IHO). The ratio column is the ratio of each of the categories above zero to the proportion in the zero category.

(Mary): Right.

Steve Wing: And it's a way of comparing to look for whether there's a trend across the categories of people of color.

(Mary): OK. Ok And then the 95 percent CI, can you explain that?

Steve Wing: That's CI stands for confidence interval. There's for each of the ratios there's a statistic called the standard error and the 95 percent confidence interval is a standard way of expressing that. It's the standard error times 1.96 subtracted from and added to the prevalence ratio. And it gives an idea of the amount of data that each of these ratios is based on. So, narrow confidence intervals and these are narrow shows that, if a few people were moved one way or the other it wouldn't make any difference to the prevalence ratio. It's a very stable statistic.

If for example looking at the 0.75 in the second row, the confidence interval is 0.74 to 0.75. So you could move people back between categories and it wouldn't result in much change. But if the confidence interval were say 0.30 to 2.8 then by moving a few people you would get quite a different prevalence ratio. And we provide these confidence intervals because they're very standard. I didn't spend much time writing about them.

(Mary): Yes, that's all right.

Steve Wing: And but if this report were to be read by an epidemiologist or a statistician or an economist or someone else who uses these kinds of statistics they would expect the confidence intervals to be provided.

(Mary): OK, thank you. OK now we were going to look at the 2000 study. Do you have that with you by any chance?

Steve Wing: I'm sure I haven't kind of – no, I have to open it up. Just a moment.

(Mary): OK. Well you know maybe we don't need to have you look at it in particular but …

Steve Wing: Yes, I remember it pretty well.

(Mary): OK. Was there the difference between the way you counted you developed who was impacted how you counted the people seems to be slightly different. So maybe if you could just …

Steve Wing: It is slightly different and I can explain that.

(Mary): OK.

Steve Wing: So in the 2000 study we wanted to analyze both race and poverty. Poverty is not (inaudible) it's available for census blocks. Census blocks are the smallest enumeration unit used by the U.S. Census Bureau. Race is available at the census block level but not poverty. Block groups are larger geographic areas.

And that study was based on whether there was an (IHO) in the block group because those areas are large enough to be able to contain potentially numerous (IHOs). In the current study we were not looking at poverty and that's because of the way Title VI is written. We just were looking at race and ethnicity. So we could use the census blocks which are much smaller and they would be more specific to counting people and their proximity to the (IHOs). So they are less heterogeneous because they're smaller.

Furthermore, we had the benefit of 15 years or so of research where we were getting an idea of more quantitative idea of how far away people could be impacted by the air pollutants from these facilities and we chose three miles. At some point any particular radius is arbitrary. Three miles had been used in some of our prior work and based both on our measurements and our interviews with people we felt that it was clear that people can be – can experience negative impacts of the air pollutants at that distance.

So in the latter study the 2015 report, we considered people potentially exposed if they lived in a block that was within three miles of an (IHO) as opposed to the first study where people were potentially counted as potentially exposed if they lived in a block group, a collection of blocks that had an (IHO). And the difference is because of number one, our focus on race and ethnicity and number two, our increased understanding of the distance over which these facilities can affect people. Does that answer your question?

(Mary): That answers it perfectly, thank you. And it answers another question that we had about you know over time it seemed like the – you had, there were different distances in different studies but the more recent ones we're seeing seem to be focusing on this three mile distance and so …

Steve Wing: And I would call your attention to the most recent study that was provided in your materials published just earlier this year in which we measured hydrogen sulfide at public middle schools. And in that study the quantitative relationship between the hydrogen sulfide levels at the schools and the area of the swine farms that are up wind is about three miles, five kilometers.

(Mary): Right, right yes I read that. And I have a quick question about that study. As I read it, what I understood it to say is that the monitor was placed downwind meaning the wind blows from the (case load) to the monitor at the school and that the measurements of the (hydrogen sulfide) tended to be higher when the wind was not blowing, when the air was just kind of hanging around.

Steve Wing: OK, let me elaborate …

(Mary): But there was no (measurable), OK.

Steve Wing: Just to clarify that.

(Mary): OK.

Steve Wing: The monitors were at the schools continuously for several weeks. So during the time the monitors were at the schools the wind blew from different directions and sometimes it was wind speed was below what's detectable so the air was pretty still. So the monitors were in place during all those conditions whatever direction the wind was coming from or however fast it was blowing. And what we found was that the hydrogen sulfide levels were very strongly correlated with the number of – with the area of the swine farms up wind at the hour that the measurement was made.

So basically we took all the hours that were during which the monitor was operating at the school, we divided the weeks up into hours and for each hour we assigned a wind direction and a wind speed. And for those hours when the wind was coming from a direction where there were IHOs and more IHOs and more nearby IHOs the hydrogen sulfide levels were higher.

(Mary): OK.

Steve Wing: And when the winds were coming from other directions the hydrogen sulfide levels were either undetectable or lower.

(Mary): Thank you, that was very helpful. OK, so that was a digression. We're going to go back to the – we're going to go back to the 2000 study and the 2015 study. Were there any critiques or criticisms of the 2000 study when it came out?

Steve Wing: Well I received some verbal criticism and concern. I'm not aware of you know any publications or letters to the editor or to the journal or anything like that that challenged any of our findings or our methods.

(Mary): And what – and by verbal criticism what do you mean?

Steve Wing: Well, (in) maybe it was early 2000 I presented a version of this paper at the annual meeting at the Society of Toxicology I was invited to present the results there. And after I presented the results there was some press coverage and I was called to the North Carolina branch of representatives agriculture committee to testify about this study. And some of the legislators were they seemed to be concerned about our findings.

I wouldn't say that the criticisms were about – they were not like scientific criticisms about how we analyzed the data or about the quality of the study. It was about our findings that there was this disproportionate impact. Actually I don't know if you have a copy of it but I wrote an article about that experience, that includes a description of that of my appearance before the house agriculture committee. I think it was published in 2002 and it also describes the Pork Council's use of the Public Records Act request to try and obtain confidential information about the study participants in one of our subsequent studies.

And if you're at all interested in the potential that researchers might be might face some kind of intimidation tactics when they research this topic I could send you that paper.

(Mary): Yes would you please.

(Jeryl): Dr. Wing, this is (Jeryl Covington). I do have one question about your presentation at the legislature. Do you have a copy of or do you know if that was a recorded meeting or open to the public where minutes might be available from your presentation?

Steve Wing: You know I've never seen any and I don't know, I really don't know whether there was a recording or minutes were taken.

(Jeryl): OK. Do you know if you were in a recordable room in the Archdale building?

Steve Wing: I was in the Archdale building in a committee meeting room but I don't know what their technology was.

(Jeryl): OK.

(Mary): OK, thank you. So …

(Marianne): Let me – this is (Marianne). Let me just say we'll work with Steve to collect all this stuff and then we'll send it on to you.

(Mary): That's great. Thank you.

Steve Wing: And I would also mention you know just (in turn) that there were some pork industry lobbyists at that meeting who approached me after the public session to express their discontent.

(Mary): You mean after the – after you gave your testimony?

Steve Wing: Yes, that's right. And so these criticisms are not written or public to my knowledge but you ask if there were criticisms and that's what you know in particular what stands out for me.

(Mary): And is that were those – do you have that recorded in the article you wrote?

Steve Wing: Yes, I have some information in that yes.

(Mary): OK great, thank you. Well the next question was like a follow up to that as to whether anything you heard about the 2000 study led to a change in the methodology for 2015.

Steve Wing: No.

(Mary): OK.

Steve Wing: As I said, the criticisms that I heard were not about how the study was conducted or the data quality or the analytical methods. It was only about the findings and our interpretation.

(Mary): OK. And maybe just can you just tell us what the basis was, what the criticism was about the findings?

Steve Wing: Basically it was the criticism was well what do you expect? This is where the industry goes and it's poor and communities of color.

(Mary): What? No he's saying that …

Steve Wing: So basically the point that this shouldn't be surprising and it's not really news or anything.

(Mary): Right, OK. OK, so the 2014/2015 study did – was that sent to it was well. I guess the 2014 study was sent to North Carolina because it was attached in DEQ, NCDEQ because it was attached to the Title VI complaint, right (Marianne)? They got it because it was one of your exhibits and you sent everything to them when you filed the complaint?

(Marianne): I think that's correct but we will double check that.

(Mary): OK. Did you bring that 2014 study and or the update the 2015 study, other than as a part of the Title VI complaint for the 2014 one to North Carolina DEQ's attention?

Steve Wing: No, no I didn't work directly with them.

(Mary): OK. (Marianne) did you by any chance when you sent it to us the update did it go to them?

(Marianne): I don't believe it did but I can check that.

(Mary): OK. So have you …

Steve Wing: So just to clarify for me, DEQ is aware of the civil rights complaint. Is that true?

(Mary): Yes.

Steve Wing: They have a copy of the complaint, is that true?

(Mary): Yes.

(Marianne): So I'm going to double check this but my recollection you know we before filing the complaint we submitted comments on behalf of a number of groups. You hadn't done the analysis yet but raising the concern that there was a disparate impact based on all the research that had been done up till that point and asking DEQ to do a disproportionality analysis and a disparate impact analysis. Then when we filed the complaint we – my recollection and I can I'll again double check, my recollection is we gave them a courtesy call and we sent them a copy as well.

Part of the reason I want to double check is I recall that there was one confidentiality issue and I recall our needing to let both EPA and DEQ know that that one particular map needed to be redacted and that we would send subsequent information. So my recollection is that we sent DEQ the whole package the first time around. Now when we've sent EPA subsequent filings I don't believe that we have sent DEQ additional information. And of course we went through mediation and in the mediation it was clear that they had received the complaint and it's not clear that they had read it but they had received it and you know, by that time it was more than a year had passed. So they definitely have the complaint and the study, the first study but I will check to confirm all that.

(Mary): OK, thank you. So since – and maybe this is addressed to both (Marianne) and Dr. Wing. Since – have you heard anything from DEQ about the 2014 one? Because if they got one that would be the one they got, right.

Steve Wing: I haven't heard anything from DEQ directly. In fact but that's not unprecedented. They've never contacted me about any of our research.

(Mary): OK, well that's going to short circuit a lot of our questions coming down the line here. So we'll get (inaudible).

Steve Wing: They've had you know they've had some of them research. I feel quite confident including at the North Carolina environmental justice summit. But they have not approached me with any questions or requests for further information.

(Mary): OK. So for the 2014 study I guess I'm debating whether to ask this but I'm just going to go ahead and ask it. So …

(Marianne): And (Mary), I'm sorry can I interrupt you? When you say 2014 study can we just be clear about which one we're talking about because we I think we've – you're not talking about the updated and that disparity analysis that came out in October.

(Mary): Right, I'm talking about the – well, we can say the 2014/2015 study. But I'm my assumption is that it wasn't made – the 2015 update had not been sent to DEQ. The only thing they would have gotten thus far is the 2014. So the question is just you know has there been any feedback from North Carolina DEQ on the '14 or the update? And the answer seems to be no.

Steve Wing: From my knowledge correct (and there's been) no response.

(Mary): Have you had – has there been any response or anything from the pork industry?

Steve Wing: Not to my knowledge.

(Mary): OK.

Steve Wing: And this is a topic which is a little bit sensitive. I realize this is not your question directly but I should mention, I believe you have a copy of the letter that I and some of my colleagues sent to (Christine Lawson) at DEQ before the new general permit was approved.

(Mary): Yes.

Steve Wing: You know I have to, I should let you know that I was told by an official at the National Institute of Environmental Health Sciences that I had violated their policy for (external) researchers by sending that letter. So my contacts with DEQ are of concern to the funding agency that supported most of the research described in that letter because their – they have told me that although there was a request for public comments on the general permit which is what I was responding to, that I was only supposed to inform public officials about our research if I was asked as an individual. And so this is another kind of difficult issue regarding working under federal grants is the National Institute of Health apparently has some concern about informing government officials about research conducted with support from NIH.

And so this is – and the reason I bring it up is because it's to some extent, well to a large extent a disincentive for me to engage in any conversation with government officials including DEQ …

(Mary): I see.

Steve Wing: Unless they initiate it.

(JerylJeryl): Dr. Wing let me ask you when they, when you receive that information was that one of the stipulations of grant you accepted? That's what they were outlining for you?

Steve Wing: It's not in the grant but it's a policy that was adopted I believe in 2014 but possibly 2013.

(JerylJeryl): OK. But your presentation, your public comments would have preceded that policy initiation or just in the same timeframe of the general permit being

issued? Which came first, the policy or the public hearing request by (DENA) at the time when the general permits were being renewed?

Steve Wing: OK, so I'm looking at the date of my letter to (Christine Lawson). It's December 2013 so I'm off by a year. I just slipped there. So the policy came out I believe in 2013 or possibly 2012.

(JerylJeryl): OK because I'm looking at – I'm looking at one of the postings for the public meeting on the general permit it's dated October 28th, 2013.

Steve Wing: Right, I did not appear at that meeting.

(JerylJeryl): OK.

Steve Wing: The admonition that I received from NIEHS was about the letter that I wrote.

(Marianne): So that is referring to – I'm sorry. Is it exhibit two of the complaint filed in September of 2014.

(JerylJeryl): Right, his comments on the general permit.

(Marianne): Correct.

(JerylJeryl): Yes.

(Marianne): And can I just (while) I've interrupted already, the CC list that you asked about on the complaint field September 3rd, 2014 with your initial study and all of the exhibits included (Christine Lawson) division of water resources at (DENA) and (Tom Reeder) division of water resources at (DENA). So (DENA) received, now DEQ received the original complaint with all of the attachments including the 2000 and – what we're calling the 2014 disparities analysis. We did not have that CC list on the subsequent letter we sent on April you know or other correspondence that we have.

We're assuming that the office of civil rights is collecting information from DEQ that we're not receiving and we are sending information to the office of civil rights that we similarly are not giving to DEQ. So we didn't, it's my recollection that we did not send that – any subsequent information after the

complaint. We got no response to the complaint and then we did not send any additional information nor did they ask for it after sending the complaint.

(Mary): OK. All right, thank you. Actually I just want to ask a question about NIEH. Maybe we can talk. So prior to that policy it would have been fine for you to send comments in on a general permit?

Steve Wing: That's my understanding.

(Mary): OK. For the 2014/2015 study are there any areas that you – any adjustments you'd make to it or that you, you know would explore if you had more time, money you know whatever however you might want to adjust it?

(Marianne): Before answering just so I'm clear, (Mary) when you call it the 2014/2015 study I'm not clear what that is. Can we call the first study 2014 and then the updated study so we just distinguish between them?

(Mary): Sure. The 2014 study that was updated in 2015.

Steve Wing: Right. I would you know if I had had time and support I would potentially shorten the report for submission to a peer review publication but I wouldn't change the analysis.

(Mary): OK. Are there any plans to have it submitted for a peer review or publication?

Steve Wing: It's something I want to do but I've been occupied by other concerns and so I haven't done it yet.

(Mary): OK. Well our next question was about the distances and we went through that. We did the 95 moratorium. OK so now we're going to – now we'd like to talk about the renewal, the general permit and the renewal processes. And so we have your comments for the 2014 process. Did you participate in any of the previous renewals providing comments and your studies whatever the studies you had to that point you know to DEQ?

Steve Wing: No, I did not.

(Mary): So this was the first one? OK. All right so now we're going to – we're going to run through the North Carolina specific study and we're kind of going to ask the same questions about each study. And starting with the your 2000 study about occupational and community health effects. So the – well basically the questions we're going to ask are you know was that, did you or are you aware of that study being brought to the attention of North Carolina DEQ or any other state agency?

So for example the first one is about occupational health you know was it sent to any other state agency that might have jurisdiction over the issue and then to any local agencies? And if so was there a response to it? Were any actions taken after they heard about it? And then depending on the study just we're just asking if the methodologies that were used like in their study were they the kind – is it the methodology that would be used by North Carolina DEQ's air quality division? Or if it's a water analysis were the protocols there the kind that DEQ would use?

So we're just going to sort of march through each study and ask these questions.

Steve Wing: OK so …

(Mary): Do you want to take a – do you want to take a break or anything?

Steve Wing: I think we can keep going at this point.

(Mary): OK.

(Marianne): Can I just mention before Dr. Wing answers from his point of view that I don't know the full range of ways in which DEQ might have seen these studies, heard about these studies you know government meetings, professional organizations. We know something about and Steve you can talk about the you know you've already mentioned the summit and their appearance at the summit. But I do at least want to point out that in December of 2013 you have it as exhibit three attached to the complaint, Earth Justice, Water Keeper and Southern Environmental Law Center submitted comments on the permit

renewal that's the subject of the complaint which cites to many of these studies just looking at it quickly.

For example expert note 18 cites to Wing and Wolf among others. Footnote 21 cites to Wing and all potential impact. So I don't know how Dr. Wing would possibly have known all the ways in which that information might get to DEQ but you have in your possession at least one example of ways in which that was formally presented to DEQ before they made the decision on the permit.

(Mary): Yes, yes. And that's sort of what – we're only asking him what he knows about not, you know the ways that he knows it that it may have been brought to their attention. So the idea being these studies you know we're going back to 2000 there have been – general permit has been renewed a couple of times, right in this intervening time period. And so what I'm trying to see other than the fact that he has just said that he didn't participate formally in the hearing process, submit written comments into previous renewals, is he aware himself because maybe he didn't or he participated in you know some meeting with the DEQ or whatever where they were made specifically aware of the studies. OK?

(Marianne): Yes, I mean go ahead. Yes, I want to make sure you use his expertise and time efficiently but feel free. Keep going.

(Mary): So and I understand they were all brought – they were all brought to the attention of the DEQ in your comments in 2013. What I'm trying to get at is prior to that have there been prior instances where any of these studies were formally brought to their attention. That's what I'm trying to get at. And you know we can march through all of them or just if there's a general answer of that he can give that's fine too.

Steve Wing: Well I can say that the Wing and Wolf study from 2000 that (Marianne) just mentioned, that study was the results were first released by the North Carolina department of health and human services before the paper was published in the peer review journal. And I can't believe that they would have been

unaware of that because there was press coverage and so on. But I didn't send it to them directly and I don't know if DHHS did.

Other than that I can only give the general answer that they have had personnel at our environmental justice summit where some of this research had been presented and discussed in addition to they having the opportunity to hear from neighbors of these facilities who described their personal experiences and difficulties and impacts of the air pollutants on their quality of life, ability to use their property, their health and so on.

(JerylJeryl): Dr. Wing this is one question. You said at the environmental justice meetings that have happened the network meetings you said (DENA) or DEQ representatives were there. Are you meaning the secretary or members of the water quality section? Who are you referring were at the EJ network meetings?

Steve Wing: I don't have a list of who was there but I'm sure the secretary never came, I'm sure (Christine Lawson) came. I don't know what years. I don't have a record of that. And I believe other DEQ who are department of environment and natural resources staff came and there's when (Christine) did not come.

(Mary): So the environmental justice summit, I mean (Marianne) do you have information on these meetings when they occurred and who they were with or?

(Marianne): Yes, we can get you more information about that.

(Mary): All right, yes. So the – so maybe we can follow up on that later and sort of figure that out. But it sounds like what you're saying is that over the years there have been a series of these meetings, DEQ's been invited and DEQ officials have shown up and that and you've made presentations there about your research.

Steve Wing: I have and so have other colleagues who participated in these studies.

(Mary): OK.

(JerylJeryl): And this is (JerylJeryl) again. I have one question. You mentioned that the department of health and human services released your Wing Wolf 2000 study. What were their comments to that? What reactions or follow up did you get from the department of health and human services?

Steve Wing: they actually provided financial support for that work. So their announcement of the findings took the form of a press release basically describing the results of a study that they supported.

(Mary): And then what happened? Then …

Steve Wing: Then what happened was on the same day that the press release came out the North Carolina Pork Council file a Public Record Act request. It was to me and my colleague Susanne Wolf copied to the UNC general counsel as well as to the DHHS division that funded the study demanding under the North Carolina public records statute all records associated with this study including the identities of the participants who I should note we had to protect their confidentiality in order to do this study under federal regulation.

(Mary): OK. So this was partially funded by the federal government or it came a grant through the state?

Steve Wing: Partly funded by NIEHS and partly funded by the North Carolina DHHS.

(Mary): OK, OK. And so did the department of health do anything after just releasing the study? Was there any sort of change in the world?

Steve Wing: You know I'm not sure. You know unfortunately what you're pointing out or the line of questioning is pointing out is how isolated many of us academic researchers are from the policy arena. And this is part of academic culture and it's reinforced by government agencies that are concerned that we would actually influence policy, the NIH policy to (inaudible) and we're not supposed to contact public officials.

So I've spent most of my time and effort getting the research into the open literature. I've spent some time with reporters. It's been covered not only by you know in the academic journals but to some degree by periodic journalist

reports. But I'm not working in a culture that has close connections with the regulators and you know I think that's a problem and I will admit to you that it is. But partly we can't all do everything. And given the pressures to keep our funding and teach and advise students and so on which I have to do to keep my job, it leaves limited time to engage in dialogue and routine conversation with regulators.

(Mary): OK.

Steve Wing: I mean just to explain my situation.

(JerylJeryl): Yes Dr. Wing let me ask one question here. You mentioned funding. After you did the publication with the department of health and human services the press release was submitted and you got the request for information by the Pork Council, did that impact your funding that was issued - Was – did you view that as being retaliatory in nature the request …

Steve Wing: At the same time I know there was a pork industry request that came through a U.S. senator for NIEHS to investigate our grant. I was told that by our grants officer at NIEHS. We maintained our funding at that time so they did not determine that we had done anything wrong presumably. But at – I mean it took a lot of time and grief to deal with that but I don't believe at that time it influenced our funding from the federal government.

(JerylJeryl): What about at the state level because I'm assuming that there was a pass through of the federal funds to the state level department of health and human services?

Steve Wing: No, actually the funds we got from DHHS North Carolina DHHS were not federal funds, they were state funds. And we did not receive any more state funds for this kind of work ever again.

(JerylJeryl): OK. Let me ask you this and I hate to go back but on the press release from DHHS do you feel like they were supportive of your work, dismissive of your work? What you know I want to I guess get clarity what did …

Steve Wing: Right. I believe they were supportive of our work.

(JerylJeryl): What did they do with – what did they do to further it? You said that you received no other state grant but what did they do to further the study that you and Wolf prepared?

Steve Wing: I'm not aware that they – I'm not aware of what they did beyond make public the findings. I mean I've always presumed that the North Carolina department of environment is not in a vacuum. It's insulated from all information on the outside produced by government and academic scientists. Now, maybe I'm naïve about this but I've assumed that there was at least through press coverage or some other means that there was some way that they would know about something that happens outside of their department.

(JerylJeryl): Now even with that press coverage can you go back and clarify for me, I apologize. I just want to make sure I understand. Were you contacted by any other agencies or any other industries besides the Pork Council after the press release by DHHS?

Steve Wing: No.

(JerylJeryl): OK.

Steve Wing: I mean I was contacted by people associated with the pork industry in writing, also by phone.

(Mary): And can you just talk a little bit about that?

Steve Wing: Well the part in writing was the Public Records Act request. I also received at least one phone call, maybe more than one from someone who wanted to talk with me about getting the identities of the study participants. And then gosh that reminds me, I also had some kind of bizarre voicemail that was accusing me of gosh I don't remember, may have called me a communist or something like that but I didn't pay really pay any attention to it.

(JerylJeryl): Let me ask one question. Who – since you lost this particular state funding, who's funding you at a state level for your continuation in this particular area if you don't mind?

Steve Wing: We have received no further state funds since 1999. I should say that the state health director at that time in 1999 was interested in the problem of these industrial swine operations and their impact on neighbors but he did not continue in his position beyond 2000. So I think it was partly through his interest that we were funded.

(JerylJeryl): How many applications or submissions of study details have you presented back to DHHS or any other state agency for potential funding?

Steve Wing: We have not. They to my knowledge they do not have (external) grant programs set up to fund researchers like me. The one that we had, the funding we had for the 1999 study which was published in environmental perspective in 2000, that study you know Wing and Wolf study was funded because we were collaborating with epidemiologists at DHHS. So it wasn't as though – we didn't apply for it independently.

We were actually collaborating with them because people in DHHS believed that there were problems that needed to be documented. And so they were present at the design phase of that study and participated in deliberations.

(Marianne): I'm this is (Marianne). I just want to be cognizant of the time and aware that we sent to you the office of civil rights a tremendous number of significant peer review papers on you know on the impact of hog operations on children, on health effects, on a variety of outcomes. I'm sure you all are watching the clock too but want to make sure you have time to ask Dr. Wing if you have any methodological or other questions or questions about his declaration as well.

(Mary): Thank you. We don't actually have any questions I guess (Marianne). We've read the studies, we don't have any questions on them right now. And you know to the extent we do we'll follow up and you know either you know work with Dr. Wing if he's available or you know the co-authors if that's possible you know like we were doing before.

So really the last question we had because this was the – this was the information we were most interested in right now was you know Dr. Wing's particular perspective from working in the area for a long time and getting an

understanding of how North Carolina has been you know apprised of this from perspective only and then what responses there may or may have not have been to them. And so you know sort of a wrap up question that we had was if you'd had any other if you had any Dr. Wing had any other – had interactions with North Carolina DEQ outside of the EJ summit which it sounds like there was some and submitting the comments in December 2013.

You know any interactions that you've had with North Carolina DEQ or any other part of the North Carolina government either the department of agriculture, labor you know HHS over the issue of regulating swine (cases)?

Steve Wing: I'm sure I can say very little. I should before I say definitively I could check my list of presentations that's on my CV. I'm trying to remember. I think they were mostly there was an EPA presentation but maybe not to – not to North Carolina's DEQ.

(Mary): OK.

Steve Wing: Now here it is. Now let's see, no hold on that's not it. Sorry, I wasn't prepared for this question.

(Marianne): In your legal research and testimony section, page 30 of your CV says the state of North Carolina, Wade County office administrative hearings there was a case that was involving North Carolina there. That has been a …

Steve Wing: Right. That was not about swine operations.

(Marianne): OK.

Steve Wing: But there is a section of my CV that begins on page 16 and which includes many public presentations about these – about this topic as well as other topics I've worked on the course.

(Mary): OK.

Steve Wing: It includes academic meetings in universities met.. At North Carolina State University where I'm pretty sure the one in 2010.

(Mary): The November 11th, 2010?

Steve Wing: Yes, that one I'm almost positive there would have been DEQ people there but I can't give you any names.

(Mary): OK, that's all right. That helps.

Steve Wing: And (if I) quickly scan through there I might be able to call your attention to another one.

(Mary): Do DEQ people ever come to your school and participate in any of the presentations that you have in UNC?

Steve Wing: Not to my knowledge.

(Mary): Or your presentations at Research Triangle Park?

Steve Wing: Not to my knowledge.

(Mary): OK. In your experience have you ever seen any evidence that suggested that the swine farm industry – well that North Carolina has better non-minority communities from the impacts from swine farms? Is there – is there …

Steve Wing: Well I can give you my opinion on that.

(Mary): OK.

Steve Wing: And it's I believe it's informed by experience although it's not something I could give you an equation and make a calculation of my conclusion here. But I strongly believe that these facilities would not have been permitted to operate as they do if they were primary locate – primarily located in predominantly white areas in the in other parts of the state. The facilities have extremely obvious impacts. If you go there if you I mean and you could now – let me make clear.

You could go there for a day and maybe there wouldn't be much air pollution on that day in the place you went because it's not constant all the time. And the other thing I can say is not every one is affected the same way. Some

people are more sensitive than others. And what's presented in our research are the average effects among people in the study not that everyone is affected the same way.

But those caveats aside, the effects of the air pollution from these facilities are obvious and they impact a large proportion of the people exposed. And I believe they would not be tolerated by people who have more political clout and ability to harness resources to protect themselves. I believe that this system exists as it does currently because historically eastern North Carolina is part of what's called the black belt. Many people descended from slaves who worked on plantations in that region prior to the civil war.

It's politically disenfranchised, there's a great deal of intimidation that dates back to slavery days and through (Jim Crow) and lynching and school segregation which is still a great problem. And the population there has not had the resources and has also had the historical exploitation and oppression that's preventing them from being able to insist upon having decent environmental regulations that would protect them from pollutants that would not be tolerated by others. So I think you know that's what we have is as a system would not exist if eastern North Carolina was similarly demographically and economically to for example the part of the state that I live in the Piedmont in The Research Triangle area or Charlotte or Winston Salem or Greensboro or other areas that are better off.

The industry was only able to flourish in this manner because of the characteristics of the population in eastern North Carolina. I hope that addresses your question. I realize it may be broader but.

(Mary): Yes, I think it does. We did have a question about in your – in your declaration you mentioned that in Iowa the lagoons are underneath facilities. And we were just wondering you know I mean I can imagine why they were not done in North Carolina but if you would like to expand on that statement for us. Like what you know what is it – can you talk about it and how is it that that it didn't develop this way in North Carolina?

Steve Wing: Well one facet is that the water tables in eastern North Carolina are very high. So the org waste lagoons in North Carolina store waste to some degree below ground but also above ground because the earthen dams are mounded up above the grade of the land and that's a factor. There's also a factor of temperature you know the climate's different. There may be other reasons. I'm really not familiar with how the engineering difference is developed between the two states in detail.

(Mary): OK. Did you all have any other questions? Is there anything else that you would like to add? I'm going to ask in a minute. Is there anything else that you would like to ask, I mean like to say Dr. Wing?

Steve Wing: Well, you know I realize that you have research papers and that that's not really the subject matter of your interest today. But since we're on the phone I did want to mention one thing about some more recent studies that as far as how the studies are designed, the older studies tend to be what we call cross sectional studies where exposed populations meaning people who are living or attending schools near these facilities are compared to other people who live or attend school farther away. Those studies are common and widely used – it's a widely used design in epidemiology. But they are always subject to questions about how comparable the study population the exposed and unexposed populations are. And because there's no follow up in time they're – it's always possible that the people who have the illness had it before they were exposed because we don't follow them up.

But all the more recent studies they come from a design that is not so often used in epidemiology but it's a very strong design. And those are the studies in which we measure the pollutants in people's neighborhoods and we show that their symptoms increased when the pollutant levels increased. And I mean by their symptoms their ability to engage in daily activities of daily living. Their mental health, their physical health including symptoms and blood pressure and so on and lung function.

And those studies rather than comparing people who live next to the hog operations to people who live elsewhere, we compared each person to her or himself meaning that they were their experiences when the pollutants were

present compared to the same person's experience when the pollutants were lower or absent. And it means not only do we have certainty about the timing that the effects occur after the exposures but the other factors that might differ between exposing populations and unexposed populations in cross sectional studies. Things like diet, exercise, occupation, body weight and so on, medical history. Those are not factors in these more recent studies. And this is something that has been pointed out as a great strength of our more recent work that it really does resolve some of the questions that might be raised about the earlier studies.

I just wanted you to be aware of that.

(Mary): Thank you, yes. I actually had noticed that but I can't remember which study it was where it was explained, you explained that.

Steve Wing: Oh good. OK, well I apologize for …

(Mary): No I'm sort of going through I'm trying to remember which study it was that I was reading that had that explanation about how you were doing a (inaudible). So but thank you for you know pointing that out and pointing out the idea about the difference between the older studies and the newer ones and …

(Marianne): Do you all have more questions? There are a couple of things that I wanted to make sure we got out but if you have more questions I'll wait.

(Mary): No. The only question that we had (Marianne) and I think it's probably it may be better addressed to you I don't know and it might be a quickie which is we were reading the change.org petition that (Elsie Herring) had written and in it she mentions that even when she that she smells the odors inside her house, even when she shuts the windows as the health department has advised. And so we were trying to – we've been looking around trying to figure out what you know where that came from the health department has advised. Like do you know what that means what that advisory is, how it comes out, how it got to her, what she's talking about?

So it's not necessarily for Dr. Wing unless he happens to know the answer but which health department even?

(Marianne): I don't know off the top. (Elizabeth), do you know off the top of your head?

(Elizabeth): No.

(Mary): OK. Well then …

(Marianne): We can ask (Elsie) though and you could interview (Elsie). I'll also look back at her declaration to see if there's any more detail. I assume you've already done that.

(Mary): Yes, we did. Anyway just it was just if you happened to know the answer off the top of your head otherwise yes, we can go down that path. OK, so you wanted to make sure some things got brought out (Marianne)?

(Marianne): Yes. And frankly I thought there were going to be more questions and if we had more time I think it would be important to ask more about some of Dr. Wing's studies. We talked a little bit about the methodology of the 2000 study as compared to the you know the disparities analyses. These are some of the seminal studies in the area and we have the good fortune I suppose of having them on the you know the particular facilities at issue here.

So sometimes when looking at whether facilities have an impact where by analogy or trying to say well something that happened somewhere else how does it affect here, there's a you know 2006 asthma symptoms study, the 2006 race poverty and potential exposure of middle school students, 2008 air pollution and odor, 2013 air pollution ISOs and blood pressure. Some of this was really path breaking community based participatory research. I also thought it could be helpful to get if you had any questions about the scope of Dr. Wing's expertise, you know to some degree the CV speaks for itself but I want to make – you know if time permitted I would want to make sure that if you had any questions that would be in your record.

But let me – let me just start with a couple of things that we didn't touch on at all that might not be as self evident. We talked about exhibit two which is the letter to (Christine Lawson) from December 2013 and Steve you asked about in that letter asked for the permanent list to create records to document

environmental and health impact. Was there – there was a large question about did you get any response at all but do you know are there more records available now? Was there any response to that particular request? What happened with that and why did you focus on it?

Steve Wing: I'm not aware that there have been any changes in the availability of records. At the time I was particularly looking for information on daily spring times and amounts of the application of liquid manure broadcast into the air in hopes that we might be able to use that information in our studies. But unfortunately I haven't been in a position to follow up on that.

(Marianne): We talked a little bit earlier about I think the whole – this interview started with why did you focus on swine and you mentioned the historical origins. Can you share – I guess I have two questions about the relationship between swine and poultry just to make sure this is discussed explicitly. One is the different geographic location of swine and poultry even as the poultry industry has expanded. So that's my first question.

Can you describe why we don't have perfect information about dry litter facilities for starters but also to the extent we know where those facilities are located to what degree they're co-located and to what degree they're in different places. And then I want to talk – ask a little bit about cumulative impacts in co-location.

Steve Wing: Well because the turkey and chicken facilities the broiler facilities are not permitted by the department of environment we don't have records of their locations. My understanding is that this goes back in part to post 9/11 rules that supposedly protect these facility's locations because of concerns from bio terrorism but I'm not able to rehearse in detail the rationale. But in any case we don't have latitude, longitude coordinates for the poultry facilities except for those few that use liquid waste management systems and therefore trigger the DEQ permitting.

On their geographic location just by county or by some remote imaging work that's being done there are – there is a concentration in eastern North Carolina which includes the two top turkey dense counties in the nation which are also

in the top hog dense counties in the nation so there's clearly co-location. But there's also another area of fairly intense poultry production in the western Piedmont of the state in rural areas between The Research Triangle and Charlotte and north and south of that line and these are dry litter operations again, they're not liquid waste facilities. I think where they are co-located where the swine and poultry facilities are co-located they definitely have a potential for accumulative impact because it means that there can be animal waste in the air blown from more directions.

And the poultry waste is actually harder to track as far as its spatial impact because being dry it can be transported some distance before it' applied to land. And it's that land application process that results in the most acute release of particles because the dry litter is broadcast from the newer spreaders but it doesn't necessarily occur at the site of the CAFO, a the site of the buildings. So there is that's another issue that makes for complexity in conducting research on the spatial pattern of the impact.

(Marianne): Is there – speaking as a epidemiologist or from your experience, is there any way of taking account of the cumulative impact of poultry? If you were looking at the impact of these hog facilities in eastern North Carolina is there a way you could take account of the cumulative impact or you know assess multiple exposures and/or assess also other indicators of vulnerability in the population?

Steve Wing: Yes. In fact this is the subject of a grant application that we submitted to NIEHS in which we proposed to collect particles in people's neighborhoods where they live both swine and poultry and to analyze genetic markers in the particle samples for DNA from bacteria that only live in the gut of swine and other bacteria that only live in the guts of poultry so that we could partition the particle mass present in the neighborhood into the proportion that comes from swine versus poultry. And then look at the impacts on people's health and quality of life when only swine is present, when only poultry is present and when they are both present together compared to when neither are present.

So we actually have proposed a method to do just what you asked about. Unfortunately that proposal I have to say was not funded. I submitted it around the same time that I wrote the letter to (Christine Lawson). And sometimes I fear that there may be a connection between my having violated one of their rules and the fate of our proposal but I don't have any evidence of that.

(Marianne): In the absence of that new research is there – it doesn't have to be a you know I think what you've called a cookbook method of the assessing multiple exposures but how would you take that into account or could you take cumulative impacts or …

Steve Wing: Well one thing I would do is I would refer to testimony from residents which I think in my experience much of our formal research has validated what people have reported about their experiences. So we began – I began all this research being informed by the testimony of residents. And one of the things I paid attention to was that the stories people told, the accounts of their experiences were similar between people in different places that don't know each other that suggested to me that they weren't making it up. And there's plenty of testimony about the experience of living near both swine and poultry and I would begin there.

(Marianne): (Elizabeth), do you have any questions you want to ask? I want to make sure we are able to wrap up?

(Elizabeth): No, I think that does it. Thank you so much Steve.

(Mary): Anybody else have any last words (Marianne) or Dr. Wing?

(Marianne): Well my – this is (Marianne) and you know thank you to Dr. Wing. And we will try to collect information and there were a few things that came up during the course of the conversation and we'll try to get that. And if you have any additional questions (Mary) and (JerylJeryl) and others you know feel free to let me know.

(Mary): Yes. And once again Dr. Wing, thank you very much for your time and …

Steve Wing: You're welcome. This is something that I believe is very important. I think your investigation holds out some hope for many thousands of people who are living with this pollution and we look forward to the outcome of your investigation.

(Marianne): Can I suggest one more question and this is for Steve? I'm aware that this was a complaint that you as a researcher and as a board member of North Carolina Environmental Justice network thought should be brought. Could you share with the office of civil rights why you thought it was important to bring it?

Steve Wing: To bring a complaint?

(Marianne): Yes.

Steve Wing: Well, I feel that as I understand the history that Title VI has been used in the past to address disparities in access to hospitals and schools and public transportation and other public facilities. And therefore there's a track record of bringing about some advancement of the persistent racial inequalities that exist in the United States through this law. But we haven't seen it impact the environment and we still have serious issues with environmental races and environmental inequality.

And I think often it's very difficult for in the case where the pollution comes from corporate entities it's very difficult to get them to change directly. But the appropriate – one appropriate way to bring about change is when there is a state agency that actually is responsible for setting the guidelines for these polluters. And it's not just about one facility at a time that might violate the Clean Water Act or the clean – or some other rule. It' about the system and permitting.

And in this case as I tried to explain earlier, I don't think we would have this system in North Carolina were it not for the presence of the black belt and its historical exploitation and lack of political and economic resources and its history of racial intimidation. So I think it's a very appropriate approach and it deals with fundamental issues of responsibility and holding our government accountable to democratic principles.

(Marianne): Thanks.

(Mary): Thank you. OK, all right well thank you very much again Dr. Wing.

Steve Wing: You're welcome. I'm happy to answer further questions if they come up later.

(Mary): Great. Thank you so much.

Steve Wing: You're welcome and bye, bye.

(Mary): All right bye, bye. Thank you.

END

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September 2, 2016

Via U.S. Mail and E-mail

Lilian Dorka, Interim Director
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Environmental Protection Agency
Mail Code 1201A
1200 Pennsylvania Avenue, NW
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Re: EPA File No. 11R-14-R4

Dear Ms. Dorka:

We submit the following letter brief regarding cumulative impacts on behalf of the North Carolina Environmental Justice Network ("NCEJN"), Rural Empowerment Association for Community Help ("REACH") and Waterkeeper Alliance, Inc. (collectively, "Complainants"), in support of their September 3, 2014 complaint against the North Carolina Department of Environment and Natural Resources (now the Department of Environmental Quality, "DEQ"), EPA File Number 11R-14-R4.

I. Introduction

DEQ currently allows over 2,000 industrial hog operations ("IHOs") with the collective capacity to raise nearly 10 million hogs in confinement to operate under the Swine Waste Management System General Permit, AWG100000 ("general permit"). Combined with DEQ's insufficient monitoring and oversight, the general permit fails to protect human health and the environment from the adverse impacts of these operations. IHOs produce massive amounts of

swine urine and feces that DEQ permits to be stored in open pits called "lagoons" and sprayed over surrounding land ("sprayfields"). The lagoon and sprayfield system not only degrades the environment, it also emits a near-constant stench and spreads dangerous pollutants, which together threaten the health, quality of life and property values of people living nearby. Flies and buzzards hover in large numbers around these operations; particles of manure drift from the sprayers to neighbors' homes, cars and clotheslines; and trucks hauling live and dead animals, as well as feed and waste to and from the facilities create traffic that disrupts and diminishes rural residents' quality of life. The density of IHOs in eastern North Carolina exacerbates these harms and contributes to the general permit's cumulative impacts.

The co-location of industrial poultry operations, which generate many of the same pollutants, further amplifies the adverse impacts of IHOs. Residents living within a three-mile radius of IHOs and poultry operations suffer from the cumulative impacts of these facilities,[1] each of which contributes to the surrounding community's "total exposure to multiple

[1] The scientific literature demonstrates that the adverse impacts of industrial animal operations extend approximately three miles or more from the facility site. *See, e.g.*, Virginia T. Guidry et al., *Hydrogen Sulfide Concentrations at Three Middle Schools Near Industrial Livestock Facilities*, J. Exposure Sci. & Envtl. Epidemiology (forthcoming 2016) (concluding that air pollution from industrial livestock facilities harms public school students located within 5 km (3.1 miles)); Brian T. Pavilonis et al., *Relative Exposure to Swine Animal Feeding Operations and Childhood Asthma Prevalence in an Agriculture Cohort*, 122 Envtl. Res. 74 (2013) (observing a significant relationship between poor respiratory health among children and environmental exposure to the cumulative impacts of all IHOs within 4.8 km (2.98 miles) of participants' homes); Patrick T. O'Shaughnessy & Ralph Altmaier, *Use of AERMOD To Determine a Hydrogen Sulfide Emission Factor for Swine Operations by Inverse Modeling*, 45 Atmospheric Env't 4617, 4624 (2011) (reporting that hydrogen sulfide emitted from large industrial livestock facilities can travel up to 6 km (3.7 miles)); Maria C. Mirabelli et al., *Asthma Symptoms Among Adolescents Who Attend Public Schools that Are Located Near Confined Swine Feeding Operations*, 118 Pediatrics e66 (2006) (finding an increased prevalence of wheezing among children who attended school within 3 miles of an IHO).

environmental stressors . . . including exposures originating from multiple sources, and traveling via multiple pathways over a period of time."[2]

As discussed below,[3] IHOs subject to the general permit are especially harmful because of the surrounding community's pre-existing vulnerability. Social, economic, behavioral, and psychological stressors experienced by the region's population further exacerbate the adverse impacts of IHOs.

Moreover, the fact that all of these operations are concentrated in Eastern North Carolina, which has historically been and continues to be the region of the state where African Americans are most heavily concentrated, means that these negative and harmful impacts also have a discriminatory effect on the basis of race.[4] As the disparity analysis submitted by Complainants shows, the percentages of African Americans, Latinos and Native Americans living within three miles of an IHO are 1.50, 1.41 and 2.22 times higher, respectively, than that of non-Hispanic whites.[5]

Complainants allege that the general permit and DEQ's lax oversight of IHOs have an unjustifiable discriminatory impact on African American, Latino and Native American residents,

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[2] Draft Title VI Guidance for EPA Assistance Recipients Administering Environmental Permitting Programs (Draft Recipient Guidance) and Draft Revised Guidance for Investigating Title VI Administrative Complaints Challenging Permits (Draft Revised Investigation Guidance), 65 Fed. Reg. 39,650, 39,665 (June 27, 2000) [hereinafter *Title VI Guidance*].
[3] *See infra* at 19-31.
[4] *See* Steve Wing et al., *Environmental Injustice in North Carolina's Hog Industry*, 108 Envtl. Health Persp. 225, 225 (2000) [hereinafter *Environmental Injustice*] ("The coastal plain region of North Carolina is also part of the southern Black Belt, a region where the agricultural economy was first built on the basis of slave labor and where a majority of rural African Americans in the United States still reside. The concentration of hog production in this poor region of the state has therefore raised the issue of environmental injustice.").
[5] Steve Wing & Jill Johnston, *Industrial Hog Operations in North Carolina Disproportionately Impact African-Americans, Hispanics, and American Indians* at 6 (revised Oct. 19, 2015), submitted as attachment 12 to Complainants' Apr. 12, 2016 letter to OCR.

in violation of Title VI of the Civil Rights Act of 1964, 42 U.S.C. § 2000d, and the Environmental Protection Agency's ("EPA") implementing regulations, 40 C.F.R. § 7.35(b)-(c) (2012).[6] Notably, obligations under Title VI extend beyond ensuring that permitted facilities do not violate environmental laws; a recipient of federal funds must also consider the potential disparate impact of a facility's operation on the basis of race, color or national origin.[7] "To establish liability under the Title VI regulations disparate impact scheme, a plaintiff must first demonstrate by a preponderance of the evidence that a facially neutral practice has a disproportionate adverse effect on a group protected by Title VI."[8] Once that prima facie showing is made, to avoid liability, the defendant must prove that there exists a substantial legitimate justification for the challenged practice.[9] "If the defendant carries this rebuttal burden, the plaintiff will still prevail if able to show that there exists a comparably effective alternative practice which would result in less disproportionality, or that the defendant's proffered justification is a pretext for discrimination."[10]

This brief, relatively narrow in scope, presents argument and information relevant to EPA's adversity determination, focusing on the necessary consideration of cumulative impacts

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[6] *See Guardians Ass'n v. Civil Serv. Comm'n*, 463 U.S. 582, 593 (1983) ("Title VI reaches unintentional, disparate-impact discrimination as well as deliberate racial discrimination.").
[7] *See S. Camden Citizens in Action v. N.J. Dep't of Envtl. Prot.*, 145 F. Supp. 2d 446, 481 (D.N.J. 2001), *modified*, 145 F. Supp. 2d 505 (D.N.J. 2001), *rev'd on other grounds*, 274 F.3d 771 (3d Cir. 2001) (granting plaintiff's request for declaratory judgment on this basis); *see also* Letter from Peter M. Rogoff, Adm'r, Fed. Transit Admin., to Steve Heminger, Exec. Dir., Metro. Transp. Comm'n, & Dorothy Dugger, Gen. Mgr., S.F. Bay Area Rapid Transit Dist. (Jan. 15, 2010), *available at* http://www.bart.gov/sites/default/files/docs/BART_MTC_Letter_On_OAC.pdf (preliminary results of compliance review revealed failure to conduct equity analysis, putting agency in danger of losing federal funds).
[8] *Elston v. Talladega Cnty. Bd. of Educ.*, 997 F.2d 1394, 1407 (11th Cir. 1993).
[9] *S. Camden Citizens in Action*, 145 F. Supp. 2d at 483.
[10] *Elston*, 997 F.2d at 1407 (citation omitted).

from multiple stressors, including the density of IHOs, the co-location of IHOs and poultry operations, and the particular vulnerability of the affected population.

II. ARGUMENT

A. EPA's Analysis of the General Permit's Impacts Must Include Cumulative Risks and Impacts

In evaluating whether DEQ's regulation of IHOs has an adverse impact, EPA must consider cumulative impacts – that is, *all* harmful effects, including heightened health risks resulting from the community's "[t]otal exposure to multiple environmental *stressors* . . . , including exposures originating from multiple *sources*, and traveling via multiple pathways over a period of time."[11] EPA's Title VI Guidance explains that "cumulative impacts of regulated and unregulated sources can be considered to determine the cumulative level of potential adverse impacts."[12] Accordingly, the Guidance directs agency investigators to "[d]etermine whether the activities of the permitted entity at issue, either alone or *in combination with other relevant sources*, are likely to result in an impact."[13] In conducting investigations, the Office of Civil Rights ("OCR") "*generally expect[s]* to assess potential adverse cumulative impacts" in addition to harms stemming directly from the challenged permit.[14]

Assessing cumulative impacts is essential to the effective and meaningful enforcement of Title VI, especially in light of the clear public health threat associated with community-wide exposure to multiple social, economic, behavioral and environmental stressors. As the agency acknowledged more than 16 years ago, "[i]t [is] a rare situation where the permit that triggered

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[11] *Title VI Guidance*, 65 Fed. Reg. at 39,684 (emphasis added).
[12] *Id.* at 39,678.
[13] *Id.* at 39,676 (emphasis added).
[14] *Id.* at 39,678 (emphasis added).

the complaint is the sole reason discriminatory effects exist."[15] Therefore, "[e]fforts that focus on all contributions to the adverse disparate impact, not just from the permit at issue, will likely yield the most effective long-term solutions."[16]

EPA recently reiterated the importance of accounting for cumulative impacts in investigating Title VI complaints. Specifically, in 2013, the agency asserted that "presuming compliance with civil rights laws wherever there is compliance with environmental health-based thresholds may not give sufficient consideration to other factors that could also adversely impact human health," including cumulative impacts.[17]

EPA has further emphasized the importance of assessing cumulative impacts by encouraging decision-makers to apply screening tools to more readily consider multiple and interacting factors. For instance, EPA developed EJSCREEN, an environmental justice screening and mapping tool, to help users identify areas with a "*combination* of environmental and demographic" characteristics that, together, indicate heightened vulnerability.[18]

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[15] *Id.* at 39,669.
[16] *Id.*
[17] Draft Policy Papers Released for Public Comment: Title VI of the Civil Rights Act of 1964: Adversity and Compliance With Environmental Health -Based Thresholds, and Role of Complainants and Recipients in the Title VI Complaints and Resolution Process, 78 Fed. Reg. 24,739, 24,742 (Apr. 26, 2013).
[18] EPA, *Purposes and Uses of EJSCREEN*, https://www.epa.gov/ejscreen/purposes-and-uses-ejscreen (last updated June 3, 2016) (emphasis added); *see also* Office of Envtl. Health Hazard Assessment, CalEnviroScreen Version 2.0 (Oct. 1, 2014), *available at* http://oehha.ca.gov/calenviroscreen/report/ calenviroscreen-version-20 ("screening methodology that can be used to help identify … communities that are disproportionately burdened by multiple sources of pollution"); *see also South Camden Citizens in Action v. N.J. Dep't of Envtl. Prot.,* 2006 WL 1097498, at *25-27 (D.N.J. Mar. 31, 2006) (discussion of a screening model that the New Jersey Department of Environmental Protection developed to identify areas where an applicant proposing a new facility would be strongly encouraged to address potential environmental equity concerns, in the context of evaluating an alleged Title VI violation). New Jersey's screening tool was developed to "show geographic sensitivity to equity issues." *Id.* at *25. In contrast, Respondent DEQ has failed to conduct a disparity analysis of its general permit or other policies

EPA's analysis of adverse impacts under Title VI operates independently of federal environmental laws and need not be lengthy or complex. In 2013, for example, the Federal Highway Administration ("FHA") determined that the City of Beavercreek, Ohio's decision to deny an application to install additional bus stops had a disproportionate adverse impact simply by reviewing the racial composition of the impacted population, with scant attention to the measurement of adversity.[19] Based on these statistics, the FHA concluded that "African Americans disproportionately rely on [bus] service compared with whites" and, therefore, "African Americans are disproportionately affected."[20] Notably, this common sense approach did not require an unnecessarily burdensome study of wide-ranging potential impacts, such as the number of injuries that might result from additional pedestrian traffic in areas where buses were unavailable or the aggregate economic consequences of additional journeys by car. The U.S. Commission on Civil Rights has encouraged EPA to apply a similar common sense approach to its analysis of cumulative impacts under Title VI: "Rather than making a case that it is an

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regarding IHOs, poultry operations or other animal waste operations. Instead, it has taken the same position that was rejected by the *S. Camden* court in 2001 and again in 2006: that because DEQ does not choose the location of those operations, it cannot be responsible for the racially discriminatory impacts from them. *Compare* attached *Report on the Proposed Renewal of the State General Permits for Animal Feeding Operations*, Response 2a at 9-10 (Mar. 2014), *with S. Camden Citizens in Action*, 2006 WL 1097498, at *77-79, and *S. Camden Citizens in Action*, 145 F. Supp. 2d 446, 495 (D.N.J. 2001) *rev'd* ("[Intervenor-Defendant St. Lawrence Cement Co.] ignores the fact that without receiving a permit from the NJDEP, none of the hundreds or thousands of business [sic] to which it refers may legally operate in the State of New Jersey . . . . EPA implicitly rejected SLC's contention that there is no causal connection between the distribution of facilities and the permitting process when it issued the implementing regulations to Title VI.").

[19] *See* Letter from Warren S. Whitlock, Assoc. Adm'r for Civil Rights, Fed. Highway Admin., to Michael Cornell, City Mgr., City of Beavercreek, Ohio (June 26, 2013), *available at* https://www.justice.gov/sites/default/files/crt/legacy/2014/07/07/DOT_fhwa_decision-_lead_v_city_of_beavercreek_june_2013.pdf.

[20] *Id.* at 11.

enormous scientific challenge to sort out the various environmental factors causing adverse human health outcomes, [EPA] must establish a cumulative impact based on the best available research."[21]

In emphasizing the *importance* of cumulative impacts, however, EPA's Title VI Guidance is consistent with accepted standards for evaluating risks and impacts. As the National Research Council stated, "[I]t is difficult to imagine any risk assessment in which it would not be important to understand the effects of coexposures to agents or stressors . . . or to identify characteristics of the of the affected populations that could contribute to vulnerability to a given exposure."[22] Similarly, the National Environmental Policy Act ("NEPA"), 42 U.S.C. § 4321 *et seq.*, directs the federal government to consider the cumulative impacts of all "major Federal actions significantly affecting the quality of the human environment."[23] NEPA's implementing regulations define "cumulative impacts" as the "impact[s] on the environment which result[] from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions."[24] Importantly, "[c]umulative impacts can result from individually minor but collectively significant actions taking place over a period of time."[25] As the D.C. Circuit has recognized, "even a slight increase in adverse conditions that form an

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[21] U.S. Comm'n on Civil Rights, *Not in My Backyard: Executive Order 12,898 and Title VI as Tools for Achieving Environmental Justice* 125 (2003). Significantly, methodologies exist to account for cumulative impacts. *See, e.g.,* Devon C. Payne-Sturges, *Developments in Cumulative Risk Assessment* (Aug. 12, 2015).
[22] Nat'l Research Council, *Science and Decisions: Advancing Risk Assessment* 219 (2009).
[23] 42 U.S.C. § 4332(C).
[24] 40 C.F.R. § 1508.7.
[25] *Id.*

existing environmental milieu may sometimes threaten harm that is significant. One more factory . . . may represent the straw that breaks the back of the environmental camel."[26]

In the present situation, EPA must consider three stressors that contribute to the general permit's cumulative adverse impact. First, EPA must account for the cumulative impacts of more than 2,000 IHOs in a relatively small geographic area. Eastern North Carolina is more densely populated with hogs than anywhere else in the United States. Second, EPA must analyze the environmental contamination and associated risks to human health stemming from the cumulative impacts of IHOs and the many industrial poultry operations clustered in this same region. Finally, any analysis of the adverse impacts of IHOs in eastern North Carolina would be grossly inadequate without consideration of the affected community's pre-existing vulnerability, which results from racial discrimination, poverty, and other factors.

B. Co-location of Industrialized Poultry Operations Generates Cumulative Impacts

North Carolina's poultry industry has grown rapidly in the eastern portion of the state, where DEQ's lax oversight has also allowed IHOs to proliferate.[27] Of the state's 100 counties, Duplin and Sampson are tied for first in the state with the highest number of hogs; the second-highest and highest number of turkeys; and the highest and fifth-highest number of broiler

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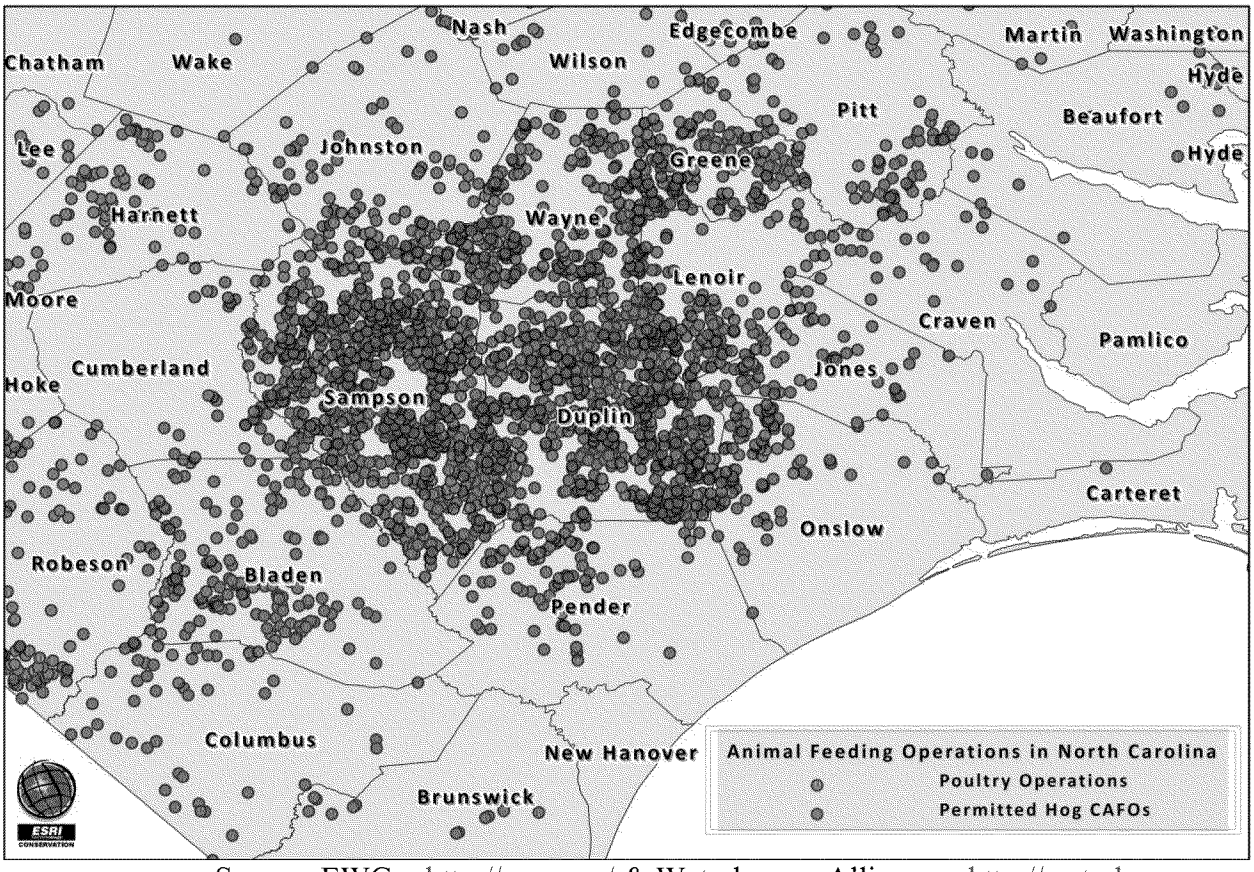
[26] *Grand Canyon Trust v. Fed. Aviation Admin.*, 290 F.3d 339, 343 (D.C. Cir. 2002) (quoting *Hanly v. Kleindienst*, 471 F.2d 823, 831 (2d Cir. 1972)). Analysis of cumulative impacts is also consistent with principles of environmental justice and the recommendations of the National Environmental Justice Advisory Council ("NEJAC"). *See, e.g.*, NEJAC, *Ensuring Risk Reduction in Communities with Multiple Stressors: Environmental Justice and Community Risks/Impacts* (2004); H. Patricia Hynes & Russ Lopez, *Cumulative Risk and a Call for Action in Environmental Justice Communities*, 1 J. Health Disparities Res. & Prac. 29, 31 (2007) (discussing NEJAC recommendations and calling for "evidence-based action by exploring multiple and cumulative factors that have been found to increase vulnerability to pollution and risk to ill health").

[27] *See* Food & Water Watch, *Factory Farm Map*, http://www.factoryfarmmap.org/ (last visited Aug. 19, 2016).

chickens.[28] Although North Carolina does not publish the locations of poultry operations, data compiled by Environmental Working Group and Waterkeeper Alliance reveal a striking degree of co-location.[29]

Figure 1. Co-Location of IHOs and Poultry Operations in Eastern North Carolina



Source: EWG – http://ewg.org/ & Waterkeeper Alliance – http://waterkeeper.org

Because IHOs and poultry operations generate many of the same pollutants,[30] co-location increases "aggregate exposure" – that is, "exposure by all routes and pathways and from all sources of each given agent or stressor"[31] – and, thus, amplifies harm to human health and the

[28] U.S. Dep't of Agric. & N.C. Dep't of Agric. and Consumer Serv., *2015 North Carolina Agricultural Statistics* 45, 53, 55 (2015), *available at* http://www.ncagr.gov/stats/2015AgStat/AgStat2015.pdf.
[29] *See* Figure 1, *infra*.
[30] *See* Table 1, *infra*.
[31] Nat'l Research Council, *Science and Decisions: Advancing Risk Assessment* 213 (2009).

environment. Peer-reviewed scientific research – bolstered by the personal accounts of individuals living in close proximity to both IHOs and poultry operations – demonstrate that, together, these facilities have negative cumulative impacts on: (1) air quality, (2) water quality, (3) risk of infectious disease, and (4) local property values.

Table 1. Summary of Swine and Poultry Pollutants

Pollutant	Swine/Poultry/Both
Ammonia (*gaseous*)	Both
Campylobacter	Both
Drug resistant pathogens (e.g., MRSA)	Both
Fecal bacteria (*E. coli* as indicator)	Both
Heavy metals (esp. zinc, copper)	Both
Hormones	Both
Hydrogen sulfide	Both
Nitrogen (ammonium, nitrate)	Both
Odor-causing compounds	Both
Particulate matter	Both
Pharmaceuticals, incl. antibiotics	Both
Phosphorus	Both
Salmonella	Both

1. Air Quality

IHOs and poultry operations emit offensive odors, threatening the health and quality of life of people living in the affected community. Declarants reported harm stemming from the combination of hog and poultry odors:

> I noticed the hog and chicken farms when I lived at Sarecta Road in Pink Hill. They would spray in the afternoon. When they sprayed, the smell would last for about three or four days. They would spray the chicken waste in the fields right across the street. It was terrible. When they sprayed the hog waste, I could smell the waste. I could smell the dead hogs on the trucks that passed by, and I could smell the fluid they left on the road. I could smell it from miles away. My children played outside a lot when I lived on Sarecta Road. They didn't like that smell at all. When they

> smelled it, they came back inside. I liked to dr y my clothes outside, but when it smelled outside, I had to take my clothes to a laundromat.[32]
>
> I only dry my clothes out on the line in the winter because the smell isn't as bad from the hogs and the chickens. It's still there in the winter time, but it's not as bad because they're not producing as much. In the spring, the summer, and the fall, it just stinks -the smell from the hog and chicken farms is sickening. In the summertime, there's more heat and the wind blows and it carries the smell.[33]
>
> Between the chicken farms and the hog farms, it smells really bad.[34]

Scientific research supports these assertions. Odors from IHOs and poultry operations cause annoyance, which is associated with respiratory and gastrointestinal problems, depression and physiological symptoms of stress.[35]

Odor from IHOs and poultry operations is a manifestation of air pollution that directly harms human health. For example, air pollution from industrial animal facilities is "strongly correlated" with infant mortality.[36] The specific compounds emitted by IHOs and poultry operations vary according to species and waste management practices, but generally include ammonia and nitrogen containing compounds, hydrogen sulfide, methane, particulate matter, pathogens, volatile organic compounds and volatile fatty acids.[37] Although specific data is not

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[32] Ex. 32, Decl. of
[33] Ex. 33, Decl. of
[34] Ex. 34, Decl. of

Ex. 6 - Personal Privacy

[35] Mariette Hooiveld et al., *Odour Annoyance in the Neighborhood of Livestock Farming – Perceived Health and Health Care Seeking Behaviour*, 22 Annals Agric. & Envtl. Med. 55 (2015); *see also* Paul Ebner, Purdue Extension, *CAFOs and Public Health: Odor and its Possible Health Effects* (2008), *available at* https://www.extension.purdue.edu/extmedia/id/cafo/id-361-w.pdf.
[36] Stacy Sneeringer, *Does Animal Feeding Operation Pollution Hurt Public Health? A National Longitudinal Study of Health Externalities Identified by Geographic Shifts in Livestock Production*, 91 Am. J. Agric. Econ. 124, 135 (2009).
[37] Mich. Dep't of Envtl. Quality, *Concentrated Animal Feeding Operations (CAFOs) Chemicals Associated with Air Emissions* 2 (2006), *available at* https://www.michigan.gov/documents/CAFOs-Chemicals_Associated_with_Air_Emissions_5-10-06_158862_7.pdf.

available, poultry operations likely contribute significantly to aggregate ammonia exposure in Eastern North Carolina. Hydrogen sulfide and ammonia cause irritation of the eyes and respiratory system.[38]

Particulate matter ($PM_{2.5}$ and PM_{10}) originating from both swine and poultry CAFOs is "mainly comprised of organic material such as fecal matter, feed materials, pollen, bacteria, endotoxins, fungi and viruses (and their products), skin cells and the products of microbial action on feces and feed," along with some inorganic components such as silicates, calcium carbonate, and free silica.[39] Poultry operations in particular involve additional types of particulates, such as bedding materials and feathers.[40] Exposure to particulate matter can cause "adverse inflammatory, toxic, or allergic effects" resulting in respiratory problems, the most common of which is bronchitis.[41] Under humid conditions, dust and other particulates transport ammonia deep into the lungs, posing an increased risk of harm.[42]

2. Water Quality

In eastern North Carolina, IHOs and poultry operations are concentrated near some of the state's most important water-bodies,[43] in a region rich with rivers and streams.[44] Waste from industrial animal facilities contaminates surface and ground water with excess nutrients (such as

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[38] Dana Cole et al., *Concentrated Swine Feeding Operations and Public Health: A Review of Occupational and Community Health Effects*, 108 Envtl. Health Persp. 685, 686 (2000).
[39] Mich. Dep't of Envtl. Quality, *supra* n.37, at 9.
[40] *Id.*
[41] *See* Kelly Donham et al., *Synergistic Effects of Dust and Ammonia on the Occupational Health Effects of Poultry Production Workers,* 8 J. Agromedicine 57, 60 (2002).
[42] Cole, *supra* n.38, at 686.
[43] *See* Figure 2, *infra.*
[44] *See* Figure 3, *infra.*

phosphorus and nitrogen), heavy metals, microbial pathogens, and pharmaceuticals.[45] Phosphorus contributes to toxic algal blooms, which threaten aquatic organisms and render water unsafe for drinking and recreation.[46] IHOs and poultry operations also generate significant quantities of nitrogen.[47] Nitrate – which results when microorganisms in soil transform organic nitrogen into ammonium, and ammonium into nitrate[48] – poses a direct threat to human health.[49] High nitrate concentrations in water are associated with diarrhea, respiratory disease and blue-baby syndrome.[50] Even at levels considered safe by the EPA, nitrate might increase the risk of insulin-dependent diabetes.[51] In eastern North Carolina, IHOs and poultry operations have already contributed to dangerous nitrate concentrations in groundwater; researchers have measured samples reaching 150 mg/L (15 times the level considered safe) from beneath a field fertilized with poultry litter and 100 mg/L (10 times the level considered safe) from beneath a

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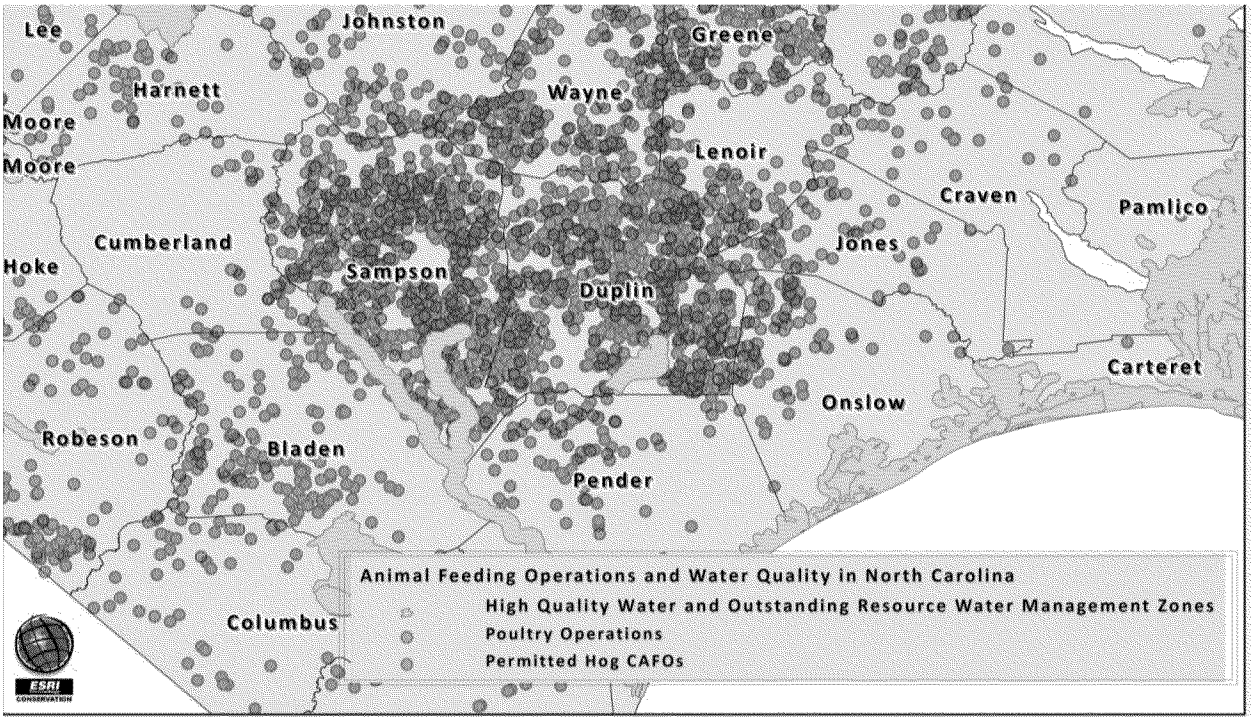
[45] JoAnn Burkholder et al., *Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality*, 115 Envtl. Health Persp. 308 (2007).
[46] *Id.* at 310; Ian R. Falconer & Andrew R. Humpage, *Health Risk Assessment of Cyanobacterial (Blue-Green Algal) Toxins in Drinking Water*, 2 Int'l J. Envtl. Res. & Pub. Health 43, 48 (2005).
[47] *See* Table 2, *infra*.
[48] Courtney Johnson et al. Cornell Univ. Cooperative Extension, *Nitrogen Basics – The Nitrogen Cycle* 1-2 (2005), *available at* http://cceonondaga.org/resources/nitrogen-basics-the-nitrogen-cycle.
[49] *Id.*; Michael A. Mallin & Lawrence B. Cahoon, *Industrialized Animal Production – A Major Source of Nutrient and Microbial Pollution to Aquatic Ecosystems*, 24 Population & Env't 369, 379 (2003) (contributing to growth of *Pfiesteria shumwayae*, exposure to which has affected the health of researchers); Burkholder, *supra* n.45, at 310 (noting health risks associated with high nitrate levels in drinking water, including hyperthyroidism).
[50] *See* Burkholder, *supra* n.45, at 310.
[51] *Id.*

field fertilized with hog manure.[52] Because the vast majority of rural residents nationwide derive their drinking water from groundwater, this contamination raises serious concerns.[53]

[see figures on next page]

[52] *See* Timothy B. Spruill et al., *Application of Classification-Tree Methods to Identify Nitrate Sources in Ground Water*, 31 J. Envtl. Quality 1538, 1542 (Table 2) (2002) (NO3N column, measured in milligrams/liter).
[53] *See* Ellen K. Silbergeld et al., *Industrial Food Animal Production, Antimicrobial Resistance, and Human Health*, 29 Ann. Rev. Pub. Health 151, 160 (2008).

Figure 2. IHOs and Poultry Operations Are Concentrated Near Important Water-bodies



Source: EWG – http://ewg.org/ & Waterkeeper Alliance – http://waterkeeper.org

Figure 3. Eastern North Carolina Water-bodies

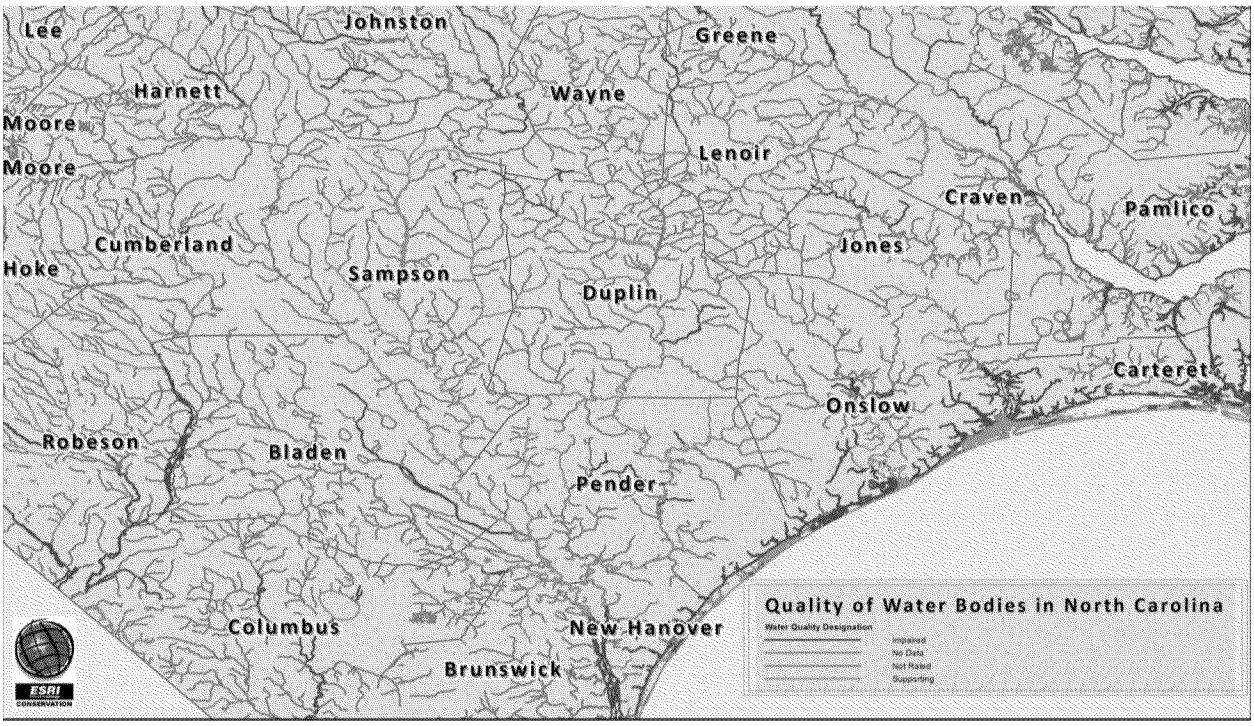


Table 2. Estimated N Outputs from NC Livestock[54]

	2000-2001 (1 year)		2012	
	Population	**Estd. N (kg/yr)**	**Population**	**Estd. N (kg/yr)**
Broiler chicken (Production)	210,000,000	3.57×10^6	799,700,000	1.36×10^7
Turkey (Production)	31,800,000	1.26×10^7	36,000,000	1.42×10^7
Swine (standing stock on Dec 1)	8,700,000	1.01×10^8	9,000,000	1.01×10^8

Waterborne pathogens also pose risks for human health and the environment. Livestock pathogens are transmitted to surface waters via storm water runoff from manure- and litter-fertilized fields, and to groundwater through percolation.[55] *E. coli* bacteria are present in the feces of all mammals,[56] and are "considered the most suitable indicator organism [of waterborne pathogens] due to their specificity to fecal sources of contamination."[57] In addition to indicating the presence of other potentially harmful microbes, some strains of *E. coli* cause illness directly, as in the case of *E. coli 0157:H7* and hemorrhagic colitis.[58] Research reveals a statistically

[54] From North Carolina Department of Agriculture ("NCDA") census data. Levels of total nitrogen emissions from poultry litter may be higher. This estimate neglects possible nitrogen constituents of bedding material, which along with manure comprises poultry litter. Mallin & Cahoon, *supra* n.49, considered only the nitrogen outputs in excreta. 2012 estimates assume that the ratio of sows to grower/finisher pigs is the same as in 2000-2001. Data for 2000-2001 come from Mallin & Cahoon, *supra* n.49, at 374 (Table 1). Population data for 2012 come from the NCDA Census 2012.
[55] *See, e.g.,* Charles P. Gerba & James E. Smith Jr., *Sources of Pathogenic Microorganisms and Their Fate During Land Application of Wastes*, 34 J. Envtl. Quality 42, 42 (2005).
[56] Maren Anderson & Mark Sobsey, *Detection and Occurrence of Antimicrobially Resistant E. Coli in Groundwater on or Near Swine Farms in Eastern North Carolina*, 54 Water Sci. & Tech. 211, 211 (2006).
[57] Joshua S. Gruber et al., *Coliform Bacteria as Indicators of Diarrheal Risk in Household Drinking Water: Systematic Review and Meta-Analysis*, 9 PLOS ONE e107429, 1 (2014).
[58] Mich. Dep't of Envtl. Quality, *supra* n.37, at 12.

significant relationship between the incidence of diarrhea and *E. coli* concentrations in drinking water.[59] In eastern North Carolina, scientists have discovered "antibiotic-resistant *E. coli* . . . in groundwaters associated with commercial swine farms that have anaerobic lagoons and land application systems for swine waste management."[60] *Campylobacter* species are also commonly found in both swine and poultry waste, and are responsible for campylobacteriosis.[61] Symptoms typically include diarrhea, cramping, abdominal pain, fever, nausea, and vomiting; among immunocompromised individuals, campylobacteriosis can lead to a life-threatening bloodstream infection.[62] In addition, *salmonella* species, which cause the illness of the same name, are common to swine and poultry.[63] These pathogens and the associated diseases compound the risks and burden frequently linked to swine.[64]

3. Risk of Infectious Disease

Houseflies breed in manure and, consequently, occur in elevated numbers in communities surrounding IHOs and poultry operations.[65] More than mere nuisances, flies carry pathogens found in swine and poultry feces, such as *Campylobacter*, and may play a significant role in

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[59] *See* Gruber et al., *supra* n.57, at 12 (finding an association between the presence of *E. coli* in drinking water and diarrhea after completing a review of earlier research).
[60] Anderson & Sobsey, *supra* n.56, at 218.
[61] Mich. Dep't of Envtl. Quality, *supra* n.37, at 12; Ctrs. for Disease Control and Prevention, *Food Safety: Campylobacter* (last updated June 3, 2014), http://www.cdc.gov/foodsafety/diseases/campylobacter/index.html
[62] Ctrs. for Disease Control and Prevention, *supra* n.61.
[63] Gerba & Smith, *supra* n.55, at 43.
[64] *Id.*
[65] Carrie Hribar, Nat'l Ass'n of Local Boards of Health, *Understanding Concentrated Animal Feeding Operations and Their Impact on Communities* 8 (Mark Schultz ed., 2010), *available at* http://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf.

transmitting bacterial infections.[66] Researchers have found an association between fly population control and the reduced incidence of diarrheal diseases.[67]

4. Local Property Values

The co-location of IHOs and poultry operations causes a reduction in local property values. Studies show that "[a] single animal production facility decreases nearby property values by up to 6.4%."[68] This finding is consistent with the concerns of residents living near IHOs subject to the general permit:

> We have concerns about the property value. I think it would be difficult for my mother to sell the house because of the problems from the hog farms and the chicken farms.[69]
>
> I am concerned about my property value because of the hog farms and the turkey farms being so close. I think the value of the house will be lower than what it otherwise should be if my house was not surrounded by hog farms. I can prove that the value of my house has been going down because the tax papers show the value is declining. It has declined by at least $10,000 in the last ten years, the same time period when the hog farms came to my neighborhood.[70]

C. The Vulnerability of the Impacted Population Exacerbates the General Permit's Adverse Impacts

Evaluating the particular vulnerability of the impacted population is a crucial element of EPA's adversity analysis.[71] Since 1995, EPA has recognized "the potential importance of other

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[66] Gordon L. Nichols, *Fly Transmission of Campylobacter*, 11 Emerging Infectious Diseases 361, 363 (2005); *see also* Silbergeld et al., *supra* n.53, at 161.
[67] Nichols, *supra* n.66, at 361. See discussion, *supra*, for information on specific pathogens common to swine and poultry waste including *E. coli*, *Campylobacter* and *Salmonella*.
[68] Richard C. Ready & Charles W. Abdalla, *The Amenity and Disamenity Impacts of Agriculture: Estimates from a Hedonic Pricing Model*, 87 Am. J. Agric. Econ. 314, 325 (2005) (examining impact on value of properties within 1,600 meters of animal production facilities).
[69] Ex. 33, Decl. of Ex. 6 - Personal Privacy ¶ 9.
[70] Complainants' Supplement to the Record, Attachment 2, Anonymous Decl. II (Apr. 12, 2016).
[71] Risk Assessment Forum, U.S. Envtl. Prot. Agency, *Framework for Cumulative Risk Assessment*, EPA/630/P-02/001F, 39 (2003) (hereinafter "2003 Framework").

social, economic, behavioral, or psychological stressors that may contribute to adverse health effects (e.g., existing health condition, anxiety, nutritional status, crime, and congestion)."[72] The agency considers a number of factors to determine vulnerability: susceptibility/sensitivity, differential exposure, differential preparedness, and differential ability to recover.[73]

The relevance of differential exposure is clear: decades of scientific research establish that pollution and polluting industries are concentrated in low-income communities and communities of color, leading to significant health disparities.[74] High levels of pollution increase community stress, "by driving down local property values, increasing the flight of jobs and fostering a climate of uncertainty and fear."[75] Community stress, in turn, contributes to individual stress, which weakens the body's ability to recover from harmful exposure and, in some situations, leads directly to illness.[76] Individual stress also results from experiencing discrimination and other race-associated stressors, such as low socioeconomic status and low

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[72] 2003 Framework at 39.
[73] *Id.* (citing Roger E. Kasperson, 2000 Personal communication as part of an EPA Science Advisory Board Consultation on the draft Framework for Cumulative Risk Assessment).
[74] *See, e.g.,* George Alexeeff et al., OEHHA, *Cumulative Impacts: Building a Scientific Foundation* at 5-17 (Joan Denton et al., eds 2010), http://oehha.ca.gov/media/downloads/calenviroscreen /report/cireport123110.pdf (reviewing the scientific literature).
[75] Gilbert C. Gee & Devon C. Payne-Sturges, *Environmental Health Disparities: A Framework Integrating Psychosocial and Environmental Concepts*, 112 Envtl. Health Persp.1645, 1646 (2004).
[76] Peter L. deFur et al., *Vulnerability as a Function of Individual and Group Resources in Cumulative Risk Assessment*, 115 Envtl. Health Persp. 817, 819 (2007) (discussing the effect of the combination of hazardous social and physical environments with psychosocial stress resulting in further widening of health disparities along racial and socioeconomic lines).

income.[77] Ultimately, "compromises in individual and community health may further weaken community resources, leading to a vicious cycle."[78]

Differential preparedness refers to the availability of "coping systems and resources" that enable a population to "withstand the insult of the stressor[s]."[79] EPA's final factor, "differential ability to recover from the effects of the stressor," also considers coping systems and resources; if the communities suffering from the cumulative adverse impacts of IHOs had higher quality housing, more responsive political representation, and reliable access to indoor recreational facilities, health care, nutrition, educational and economic opportunities, they would be better prepared and able to recover from multiple stressors, created by IHOs.

1. Communities of Color in North Carolina Are Especially Vulnerable to the Adverse Impacts of IHOs

Like communities of color across the country,[80] African American, Latino and Native American communities in eastern North Carolina are disproportionately burdened by pollution and are less healthy than the population as a whole.[81] A 2013 statewide study by the UNC

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[77] Vickie M. Mays et al., *Race, Race-Based Discrimination, and Health Outcomes Among African Americans*, 58 Ann. Rev. Psychol. 201, 205 (2007) ("Biological measures of race-based stress (allostatic load) reveal intricate relationships among the brain, immune system, autonomic nervous system, and the hypothalamic-pituitary-adrenal (HPA) axis, as well as the ways in which unhealthy environmental stimuli can "get under the skin" of individuals to cause negative health outcomes.")
[78] Gee & Payne-Sturges, *supra* n.75, at 1646.
[79] 2003 Framework at 41; *see also* deFur et al., *supra* n.76, at 820 ("Having the perception that one can regulate the degree of negative environmental circumstances one is facing has profound effects on both psychologic and physiologic health outcomes.").
[80] *See, e.g.,* Alexeeff et al., *supra* n.74, at 5-17.
[81] *See* UNC Center for Civil Rights, *The State of Exclusion: An Empirical Analysis of the Legacy of Segregated Communities in North Carolina* (2013), *available at* http://www.uncinclusionproject.org/documents/stateofexclusion.pdf). This report tracked environmental, educational, and other impacts of residential segregation across North Carolina by identifying clusters of Census blocks where 75% or more of the population was non-white. While eastern North Carolina accounted for 26% of the state's overall population in

Center for Civil Rights found that, compared with North Carolina's general population, contiguous census block clusters that are 75% or more nonwhite experience significant disparities in exposure to adverse environmental land uses and access to education and housing.[82] More than 10% of residents of majority African American clusters live within one mile of a solid waste facility, compared to just 5% of North Carolina residents overall. 44% of residents in majority African American clusters live within one mile of an EPA-registered polluter (significantly, not including IHOs and poultry facilities), compared to 24% of residents overall.[83] Even these stark numbers fail to capture the significant vulnerabilities of the affected population. As the Center for Civil Rights explained:

> Exposure rates are determined by the percentage of the population within one mile of each [open or closed solid waste facilities including landfills of all types, waste transfer stations, incinerators, and recycling facilities]. Multiple facilities are often in the same location, which has a cumulative impact on the community. Therefore an area that hosts multiple facilities could have an exposure rate of over 100%.[84]

Similarly, elementary schools closest to majority African American clusters had a 48% chance of being rated low performing; an 81% chance of being racially identifiable; and a 68% percent chance of being high poverty, compared with 19%, 63%, and 33% statewide, respectively.[85] Housing data shows that majority Latino and majority African American clusters experience lower rates of home ownership (a crucial indicator of wealth, especially among

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2010, the region was home to 34% of North Carolinians who lived in these majority non-white clusters. *Id.* at 13.

[82] *Id.*; *see also* Peter L. deFur et al., *supra* n.76, at 820 ("Residential segregation by economic status and especially by race is a major characteristic that can shape differential exposure to environmental risks . . . . Segregation shapes all institutions in geographically segregated areas, undermining the quality of schools, homes, transportation, commercial facilities, and safety and security.").

[83] UNC Center for Civil Rights, *supra* n.81, at 20.

[84] *Id.* at 17.

[85] *Id.* at 23-27.

African Americans). Majority Native American clusters rely on manufactured housing at substantially higher rates than the state average, 44% versus 14%.[86]

A brief summary of statistics describing access to health care and corresponding health status reveal the enduring legacy of residential segregation on economic status, education, physical isolation, and racial exclusion.[87] A greater percentage of African Americans than whites lack health insurance (17.6% to 13.4%);[88] qualify as obese (39.1% to 26.7%);[89] could not afford to visit a doctor during the past year (20.6% to 13.5%);[90] did not visit a dentist during the past year (41.6% to 28.6%);[91] and reported their health as fair to poor (19.3% to 17.3%).[92]

The inequities in access to health insurance and health care are magnified by the disparities in incidence of illness and communicable disease. From 2010-2014, African Americans deaths per 100,000 from diabetes (a disease that can often be managed and treated with regular access to health care and medical resources) were 43.3, compared to less than half that (17.9) for whites.[93] Asthma, another indicator of health conditions, currently affects more

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[86] *Id.* at 28-31.
[87] *See* Gee & Payne-Sturges, *supra* n.75, at 1646-50.
[88] U.S. Census Bureau, American Community Survey, *Table S2701*, *Health Insurance Coverage Status, 2010-2014 American Community Survey 5-Year Estimates*, http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_14_5YR_S2701&prodType=table (last visited Aug. 30, 2016).
[89] N.C. Dep't of Health & Human Servs., *North Carolina Resident Population Health Data by Race and Ethnicity* (Nov. 2015) *available at* http://www.schs.state.nc.us/schs/pdf/NCPopHealthDatabyRaceEthNov2015.pdf.
[90] N.C. Dep't of Health & Human Servs., *Racial and Ethnic Disparities in North Carolina: 2010 Report Card* 7 (2010), *available at* http://www.schs.state.nc.us/schs/pdf/MinRptCard_WEB_062210.pdf.
[91] *Id.*
[92] N.C. Dep't of Health & Human Servs., *North Carolina Resident Population Health Data by Race and Ethnicity*, *supra* n.89.
[93] *Id.*

than twice as many African-American children (17.4%) as white children (7.4%) in North Carolina.[94]

Maternal and infant health statistics are another key metric relied upon by public health administrators in evaluating the overall health of a community or demographic group.[95] Because of their impact on long-term health outcomes, these indicators are an especially critical aspect of the continuing impacts of racial segregation and exclusion.[96] The 2010-2014 infant mortality rate in North Carolina (per 1000 births) for African Americans was more than double (12.9) than for whites (5.4).[97] The 2012-2014 percentage of babies born at low weight showed a similar racial gap (7.4 for whites compared to 13.6 for African Americans).[98] Both of these statistics are directly related to access to prenatal medical care. In North Carolina, 36.6% of pregnant African American women receive late (after the first trimester) or no prenatal care, compared to 21.8% of pregnant white women in the state.[99] Teenage birth rates, which can have sweeping impacts beyond immediate health outcomes (especially regarding education and economic opportunity) are also troubling. African American teenagers are nearly twice as likely to give birth as are white teenagers (41.8 births per 1000 compared to 23 per 1000, among women ages 15-19).[100]

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[94] N.C. Dep't of Health & Human Servs., *The Burden of Asthma in North Carolina* 26 (2010) *available at* http://www.asthma.ncdhhs.gov/docs/TheBurdenOfAsthmaInNorthCarolina-2010.pdf.
[95] *See* Alexeeff et al., *supra* n.74, at 15.
[96] *See* Gee & Payne-Sturges, *supra* n.75, at 1647.
[97] N.C. Dep't of Health & Human Servs., *North Carolina Resident Population Health Data by Race and Ethnicity*, *supra* n.89.
[98] *Id.*
[99] *Id.*
[100] *Id.*

Additionally, pre-term births are 1.6 times more likely for African Americans than for whites in North Carolina.[101]

All of these factors are exacerbated by the impacts of poverty and income disparities in North Carolina. In 2010, the median net worth of white families in the state was $68,441, compared to just $3,000 for African American families, leaving the ratio of African American net worth to white net worth at .04 (less than one-third the national average).[102] Researchers also found that African Americans were significantly less likely than whites to have wealth in the form of home equity, a pension, non-home property, savings, and stocks.[103]

2. Vulnerability Increases the Severity of Cumulative Impacts

The above statistics illustrate the "historical exposure, body burden, and background exposure" attaching to non-white and poor eastern North Carolina residents.[104] The EPA's consideration of this population's vulnerability must therefore include the understanding that IHOs produce a more profound effect on these residents than on a "typical individual."[105] Epidemiological research reveals the adverse interplay between the concentration of CAFOs, sub-standard housing and other attributes of poverty, and health conditions common among non-white residents in eastern North Carolina.[106] For example, in their study of the effects of air

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[101] *Id.*
[102] Ctr. on Poverty, Work & Opportunity, *Racial Wealth Disparity in North Carolina* 6 (Table 1) (2010), *available at* http://www.law.unc.edu/documents/poverty/publications/racial_wealth_disparity_in_nc_unc_cpwo.pdf.
[103] *Id.*
[104] 2003 Framework at 41.
[105] *Id.*
[106] *See Environmental Injustice*, *supra* n.4, at 226-230; Steve Wing & Susanne Wolf, *Intensive Livestock Operations, Health and Quality of Life among Eastern North Carolina Residents*, 108 Envtl. Health Persp. 233, 236-37 (2000); and Decl. of Steve Wing, ¶ 22 (Mar. 28, 2016), Att. 11 to Complainants' Apr. 12, 2016 letter to OCR.

pollution from IHOs on eastern North Carolina residents, epidemiologists noted that the area "has one of the highest densities of swine production in the world," is "home to a majority of rural African Americans," and has "high mortality from cerebrovascular and cardiovascular diseases."[107] Evidence indicates not only that odors from CAFOs are related to acute blood pressure increases "that could contribute to development of chronic hypertension," but also that "older housing and lack of central air conditioning could increase human exposure to air pollutants."[108] In a 2011 article, other scientists explained:

> Industrial hog operations in North Carolina are disproportionately located in low-income communities of color where there is more potential for exposure to outdoor air pollutants due to older homes that are not airtight and have no air conditioning. Many residents also lack the financial resources to travel and choose activities that could help them avoid high pollution.[109]

Similarly, in his March 28, 2016 declaration submitted in support of the complaint, Dr. Steve Wing noted:

> The affected communities are disproportionately composed of low-income people of color who have fewer protections from environmental hazards, less ability to leave their homes during high exposure periods, and less access to medical and clinical services than residents of higher income communities; these factors increase their vulnerability to the harmful impacts of hog CAFO emissions.[110]

Declarations by residents living within a 1-, 2- and 3-mile radius of IHOs illustrate the research findings concerning the interplay between their particular vulnerability and the cumulative impacts of the polluting facilities:

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[107] Steve Wing et al., *Air Pollution from Industrial Swine Operations and Blood Pressure of Neighboring Residents*, 121 Envtl. Health Persp. 96, 96 (2013) (submitted to OCR as Ex. 51 to Complaint).
[108] *Id.* at 92, 95.
[109] Leah Schinasi et al., *Air Pollution, Lung Function, and Physical Symptoms in Communities Near Concentrated Swine Feeding Operations*, 22 Epidemiology 208, 214 (2011) (submitted to OCR as Ex. 48 to Complaint).
[110] Decl. of Steve Wing, *supra* n.106, at ¶ 27.

> My daughter was born early. She was about 2.4 pounds when she was born. She has cerebral palsy and asthma. Her sinuses are very bad and she has bad allergies. If she's around a hog facility, I can tell it is having an impact.[111]

> I have some health problems that I think might be affected by the hog facilities.[…] Sometimes my coughing keeps me up at night. I cough more when the smell from the hog operations is at its worst. I also have high blood pressure. I've been taking medicine for my high blood pressure for 10 years. I understand that, living near hog facilities can increase my blood pressure, and this worries me. My wife is not very well. She is on a lot of medicine and coughs a lot. I am worried that it is not good for her to live near these hog facilities.[112]

> Both my husband and I suffer from highblood pressure….Before she passed away, my mother suffered from congestive heart failure and her doctor told her she needed to walk. She was sick and quite old so she was a slow walker. She would try to walk toward my aunt's house next door, but we did no t feel safe spending time outside because of the spray. No one wants to inhale the spray and the odor, but it was even worse for my mother. Because of the hog farm, my mother had to walk back and forth inside the home in order to exercise like the doctor told her. We both wished we could have walked outside.[113]

The low-income, rural population living closest to these CAFOs lack access to indoor and outdoor recreational facilities that could substitute as places for family gatherings and exercise when the stench from the IHOs and poultry operations makes it intolerable to be outside. The inability to hold gatherings with family and friends in turn has a negative impact on their health, worsening the overall cumulative impact.[114] Many of the residents living near IHOs do not own electric clothes dryers; they use outdoor lines to dry their clothes. They may not have reliable transportation other than walking. They suffer from health conditions that are all too common

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[111] Decl. of Ex. 6 - Personal Privacy (Aug. 23, 2014), submitted as Ex. 35 to Complaint.
[112] Decl. of Ex. 6 - Personal Privacy 7-19 (Aug. 31, 2014), submitted as Ex. 36 to Complaint.
[113] Decl. of Ex. 6 - Personal Privacy ¶ ¶ 6, 12 (Aug. 31, 2014), submitted as Ex. 12 to Complaint.
[114] Decl. of Steve Wing, *supra* n.106, at ¶ 22 (discussing a peer-reviewed article: "We concluded that '[t]he types of activities that are restricted by hog odor are social interactions, physical activities, energy- and cost-saving activities, relaxing outside or indoors, and sleeping.' We further noted that restriction of these activities is important because they 'have been shown to positively affect health, improve overall well-being, reduce stress, and strengthen social networks.'")

among rural poor African Americans. Declarations submitted in support of the Complaint document not only the health conditions and other stressors experienced by nearby residents, but also the lack of access to resources that might otherwise alleviate the burden imposed by pollution from these operations, as well as how those burdens exacerbate the conditions and worsen quality of life for residents:

> I had a friend who lived down the road and when I went to visit him, I often would see a mist of hog waste coming off the fields from where the farms where spraying. Because I wanted to see my friend, and *had no other way of getting there*, I would walk down the road anyway, but I was careful to cover my mouth and nose with my shirt so that I didn't have to breathe in the hog waste.[115]
>
> If we didn't have these hog issues, I would be outside most of the time. I like being outside. Especially when the weather is nice, I would like to be outside all day, but because of the hog issue, I am rarely able to stay outside. I could go to the park in order to have more time outside, like a kid should have, but the closest park that is less affected by hog farm odors is too far away for me to walk and *I do not drive*.[116]
>
> Living next to a hog facility also has affected my family's health and quality of life. My mother lived on the land from the time she was born in 1902 until she passed away in 2001. My brother, Jesse, lived on this land from the time he was born until he passed away in 2006. When the spraying began in the 1990s, both my brother's and mother's lives changed for the worst. Both my mother, who was advanced in age, and my brother, who had Down Syndrome and was crippled with gout, had trouble getting around and often stayed in or near the house. Although we had window air conditioners, they enjoyed sitting outside in the Summer when there was a breeze. But when the hog facility moved in, it was not safe to be outside. In the early years, the waste from the sprayers hit the house and could have hit us if we were outside. Even after the farmer changed his sprayers, it was not safe to sit outside and breathe in the pollution from the facility. This is especially true for my brother, who breathed through his mouth, and could have gotten sick if he inhaled the airborne pollution. So, after the hog facility moved in, to avoid the terrible smell and dangerous pollution, my family was forced to stay inside in the Summer and spend the extra money to run our window air conditioners.[117]

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[115] Decl. of Anonymous ¶ 6 (Aug. 29, 2014), attached as Ex. 5 to Complaint (emphasis added).
[116] Decl. of Ex. 6 - Personal Privacy ¶ 6 (Aug. 30, 2014), attached as Ex. 13 to Complaint (emphasis added).
[117] Decl. of Ex. 6 - Personal Privacy 28 (Apr. 18, 2014), attached as Ex. 17 to Complaint.

> I have limited mobility and spend a lot of time at home, even when I am not working. *I am on crutches and cannot drive a car*, so I have to rely on others if I want to leave the area just beyond my house. When the smell is bad or when I get stir-crazy and want to leave the house, I usually call my mother and ask her to come and pick me up, but she can't always come and get me. My mother is 70 years old and is not always up for a drive. …Because I am on crutches, it is especially difficult for me to be outside when the facility is spraying. I can't cover my nose with a handkerchief and get around on my crutches. If I have to pick up the mail or go outside to get to my deep freezer or my laundry room while the facility is spraying, I have to hold my breath to avoid the terrible odor.[118]
>
> *My sleep apnea* also has gotten a lot worse since I moved here. This January, I had to get a machine to help me breathe at night.[119]

The vulnerabilities of low-income African American, Latino and Native American communities in eastern North Carolina also are a factor in explaining why IHOs are so heavily concentrated in the area. One declarant explained the relationship:

> The Garland community is a good example of how the industry targets disadvantaged communities. In Garland, there is a trailer park on Highway 701. Mostly undocumented Hispanic workers live in the trailer park. People who live in Garland tell me that the trailer park has been there for decades. People in the park tell me that the hog facilities weren't a problem until 1998. Around that time, hog facilities were built behind the trailer park. I looked up the records and two of the hog facilities were built in 1998, one was built in 1999, and the last was built in 2001. Whoever built the hog facilities had to know that most of the people in the park were undocumented Hispanics. Low-income communities of color, particularly undocumented Hispanics, would be less likely to put up much resistance.[120]

III. CONCLUSION

Complainants NCEJN, REACH and Waterkeeper Alliance respectfully urge OCR to give appropriate weight to the following cumulative impacts:

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[118] Decl. of Ex. 6 - Personal Privacy ¶¶ 8-9 (Aug. 17, 2014), attached as Ex. 29 to Complaint (emphasis added).
[119] *Id.* ¶ 12 (emphasis added).
[120] Decl. of Ex. 6 - Personal Privacy ¶ 30 (Aug. 25, 2014), attached as Ex. 26 to Complaint.

1. The cumulative effects of the unprecedented concentration of IHOs and the co-location of IHOs and poultry operations in the relatively small geographic area of Eastern North Carolina, including horrible odors and air emissions, manure particulate that drifts from sprayers to residents' homes, cars and clotheslines; nutrient oversaturation in fields and waterways from applied waste and run-off, which causes algae blooms, fish kills and destruction of residents' recreational use of nearby rivers and streams; flies, buzzards and other disease vectors; traffic from trucks bearing dead and live animals and their waste; and nearby residents' loss of property value and enjoyment and quality of life; and

2. The cumulative vulnerabilities of the affected population due to social, economic, and psychological stressors that contribute to those effects. Residents of the areas where IHOs are concentrated already suffer higher rates of asthma, high blood pressure and related health conditions; lack of access to adequate health care, economic opportunity and indoor alternatives for exercise and recreation; sub-par housing inadequate to protect them from the odors and pollution from these facilities; and a range of stressors related to discrimination on the basis of their race and national origin. All of those factors make the adverse effects from these facilities more damaging than they would be to residents living in predominantly white and wealthier neighborhoods.

Complainants respectfully urge EPA to consider these cumulative impacts on the affected population in order to adequately assess adverse impacts and meaningfully enforce Title VI of the Civil Rights Act of 1964.

Respectfully submitted,

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Encl.

Cc: NCEJN, REACH, Waterkeeper Alliance, Inc.

ATTACHMENT 1

STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

REPORT OF PROCEEDINGS ON THE PROPOSED RENEWAL OF THE STATE GENERAL PERMITS FOR ANIMAL FEEDING OPERATIONS

PUBLIC MEETING
NOVEMBER 12, 2013
STATESVILLE, NORTH CAROLINA

PUBLIC MEETING
NOVEMBER 14, 2013
KENANSVILLE, NORTH CAROLINA

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ATTACHMENTS

Attachment 1 – Existing State General Permits
Attachment 2 – Draft Proposed State General Permits
Attachment 3 – Brief of Proposed Changes in Draft General Permits
Attachment 4 – Public Hearings Press Release and Fact Sheet
Attachment 5 – Transcript of Oral Comments from Public Hearings
Attachment 6 – Written Comments
Attachment 7 – Revised State General Permits

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I. BACKGROUND

North Carolina's existing State Animal Waste Management System General Permits are due to expire on September 30, 2014. Copies of these existing permits are contained in Attachment 1. Accordingly, the Division of Water Resources (Division) has drafted new, proposed State General Permits to replace the current permits. These draft permits will cover animal feeding operations according to the requirements of G.S. 143-215.10C and 15A NCAC 02T .1300.

The animal waste management systems to be covered by these draft permits include the collection, transfer, treatment, storage, and application of animal waste. Animal waste is collected using a variety of methods including flush systems, pit recharge systems, barn scraper systems and scraped surface lots. The waste is transmission via channels or pipes to anaerobic lagoons or storage ponds to treat and store the waste. Irrigation equipment or waste spreaders are used for application of the animal waste at agronomic rates. Animal waste is usually applied using permanent or mobile pumps and piping to traveling gun and reel systems but could also use a solid-set irrigation system, transportation and application vehicle system such as a honey wagon, and other forms of application systems for the animal waste.

North Carolina's Animal Waste Management System General Permits provide a permit option for facilities not covered by the federal NPDES permit and that have at least 100 confined cattle, 250 swine, or 30,000 poultry with a liquid waste management system. Facilities not covered by the federal NPDES permit and have less that 100 confined cattle, 250 swine, or 30,000 poultry with a liquid waste management system are deemed permitted under 15A NCAC 02T .1303 unless it experiences significant problems with its waste management system. In that case, the Division Director may require the facility to apply for coverage under a general permit or an individual permit.

In accordance with applicable requirements, the Division has proposed to renew the existing general permits with draft, revised Animal Waste System Non-discharge General Permits. The proposed permits have been revised for the following operations:

- General Permit No. AWS100000 – Swine Operations
- General Permit No. AWS200000 – Cattle Operations
- General Permit No. AWS300000 – Poultry Operations with Liquid Waste

These draft permits were sent to public notice on October 28, 2013. The public comment period closed on Friday, December 6, 2013. The proposed permits are scheduled for issuance on October 1, 2014. Copies of these draft permits are contained in Attachment 2.

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II. PROPOSED CHANGES IN THE REVISED PERMITS

The proposed draft general permits that were sent to public notice contained many of the same requirements included in the existing permits. The majority of the changes from the current permit are structural and grammatical in nature, to organize the conditions and remove some redundant language. Some changes were made to better protect the State's water resources in accordance with applicable Statute and Administrative Code. The list of new or modified conditions is as follows:

- Corrected the regulatory citation for State Veterinarian's authority to dictate proper mortality management.
- Corrected the regulatory citation for operators of Animal Waste Management Systems.
- Cleaned up language to make clear that calibration is required at least once every two years.
- Soil sampling is required at least once every three years on all fields upon which animal waste is applied.
- Waste sample submitted for analysis should represent the waste as applied – i.e., if lagoon is agitated for waste application, the sample should be taken when agitated rather than prior to agitation.
- Regional office notification is required if waste levels rise to the structural freeboard zone. A 5-Day Plan of Action must be submitted within two days that outlines steps to lower waste levels below the structural freeboard.
- Cattle operations that drop below the permitting threshold of 100 confined cattle for three years or more to request permit rescission prior to closure of waste lagoons/containment basins.
- Limits the distribution of animal waste for personal use to ten cubic yards per year.
- Updated citation to current NRCS NC Conservation Practice Standards.

A copy of a short handout briefly describing the proposed changes to the general permits, which was provided by Division staff at the public meetings, is contained in Attachment 3.

III. THE PUBLIC HEARINGS

Pursuant to NCGS 143-215.4(b)(1) and (2) and 15A NCAC 02T .0108, the Director of the Division of Water Resources determined that it would be in the public interest to conduct public hearings to receive all pertinent public comment on whether to issue, not issue, or modify the proposed general permits. Jon Risgaard, the Division's Non-Discharge Permitting Unit Supervisor, and Evan Kane, the Division's Groundwater Planning and Environmental Review Branch Chief, served as hearing officers. The hearings were conducted on November 12 and 14 in Statesville and Kenansville, respectively. A Fact Sheet and Press Release, which notified the public of the hearings and provided an overview of the revised general permits, are contained in Attachment 4. Approximately forty-six people attended these meetings and, of these, five individuals chose to present oral comments regarding the draft general permits.

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IV. THE ORAL COMMENTS

Five individuals chose to make oral comments at the public hearings. A summary of the oral comments are provided in this document along with the corresponding responses to each comment. Division Staff prepared responses for each comment and used feedback from the Hearing Officers to ensure that permit relevant public concerns were addressed. Written transcripts of all the comments received at the two meetings are contained in Attachment 5.

Comment 1: I do not feel that the calibration requirement should be included in this permit for two reasons. First, to apply waste at agronomic applications; you must recalibrate every field you apply to because every field has a different requirement. Also, every waste analysis changes, so you must recalibrate to meet the requirement of the waste to apply the waste at the proper agronomic rate. It is redundant to recalibrate every two years and have it in the file because it's a useless calibration.
Secondly, the municipal applicators which hold surface irrigation system permits and land application permits for residual solids are not required to have that every two year calibration. Requirements for the various operators should be consistent.

Response: Calibration of waste application equipment is essential to ensure that waste is being applied uniformly and at the rate intended. Animal waste is applied using various types of equipment that may or may not be adjusted at each application. Field Calibration Procedures for Animal Wastewater Application Equipment can be found on the following NC State website:
http://www.bae.ncsu.edu/topic/go_irrigation/wastewater.php

Calibration requirements are consistent with the calibration requirements for other permitted wastewater facilities. Municipal and Industrial Wastewater applicators are required to calibrate irrigation and waste disposal equipment at least once every permit cycle as a permit condition. Land application of residuals permittees must include equipment calibration and maintenance schedules in their Operation & Maintenance Plan, which is incorporated into their Permits.

Comment 2: We would oppose any additional changes to the permits that would make the permits more stringent. We would also oppose any additional changes that would make compliance with the permits more costly or burdensome to farmers.

Response: The changes made in the Permits submitted for review are necessary for protection of water quality. The only changes made in finalizing the Draft General Permits were in Conditions III.15-17, see Comment 13.22. These changes to the Permit language do not make the Permits more stringent, costly, or burdensome.

Comment 3: We request that the Division ensure through appropriate means that cattle and dairy farmer seeking permit rescission without waste structure closure be fully informed. It is particularly important that farmers understand that once the permit is

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rescinded, the farm will not be able to go above the threshold of 100 cattle in confinement without having to install substantial upgrades at their facilities. It is important that farmers are aware of all of the ramifications of their permits being rescinded before taking this step.

Response: Division staff will educate permittees of all the potential consequences of permit rescission prior to issuance.

Comment 4: In Section I.8, setbacks for application, 100 feet from any well - that is an inadequate protective setback and want much further setbacks from property boundaries and occupied dwellings as well. Our concern is in fact that these wastes could be mobile in groundwater. Given some of the evidence of contamination that has shown up in voluntary monitoring program that some of these operations applied, I think there is reason for concern and need to make those setbacks greater.

Response: Setbacks for the construction of water supply wells are established in Administrative Code. 15A NCAC 02C .0107(a)(2) Standards of Construction: Water Supply Wells requires a minimum 100 foot separation for industrial or municipal residuals disposal, wastewater-irrigation sites, animal feedlots, or manure piles. Additional setback requirements for other non-discharge disposal facilities are established in 15A NCAC 02T .0706 and 15A NCAC 02T .1006. These rules require a 100 foot setback of wastewater irrigation sites and residuals disposal, respectively, from a well. The Ninth Senate Bill 1217 Interagency Group Guidance Document, Appendix 8.1 states that the required minimum distance from the outer perimeter of the waste application area to a well is 100 feet. Based upon current regulations sited above, changes to setbacks from wells should be addressed through the rule-making process and not the Permit renewal process.

Comment 5: In section II.19, there should be no waste application in wind conditions "reasonably expected to cause mist to reach surface waters, wetlands, or cross property or field boundaries". This seems to us to be a pretty unenforceable provision, and we think this needs to be more specifically implemented in order to make a more credible permit and actually require documentation of conditions under which applications occur.

Response: Condition II.19: NC NRCS Conservation Practice Standard No. 590 – Nutrient Management, the state technical standard for animal waste application, directs operators to not apply wastes when there is a high probability that the wind will blow the material offsite. A more thorough analysis would be needed before more specific performance criteria could be implemented.

Comment 6: Section III.5 calls for an analysis of representative sample of waste that to be applied within 60 days before or after the application. If you are recalibrating for not only the field you are applying to and its conditions but also for the constituents in the waste to be applied, it seems very strange to allow this analysis to be done 60 days after the application occurs.

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Response: Condition III.5: The Permit condition states "as close to the time of application as practical and at least within sixty (60) days…" The time requirement for waste analysis is specified in G.S. 143-215.10C(e)(6) and cannot be changed by this process.

Comment 7: Section III.9 says that any discharge to surface waters or wetlands requires sampling of the waste 72 hours, up to 72 hours after the discharge is first observed and a monitoring report to the Division within 30 days. But, more appropriately it requires 24 hour notice to the regional office that this discharge has occurred. Why would you only require sampling up to 72 hours after a discharge event?

Response: The Permits require notification of the Division within 24 hours of first knowledge of a discharge. The waste sample taken by the permittee within 72 hours is required to characterize the source of the release. The Division may sample as appropriate to determine the nature of a release and the extent of the impact on the land and receiving water bodies.

Comment 8: Then in Section V.12, I know that there was some legislation this year referring to changing compliance boundaries in some cases. I am hoping that the citation to the rule in the Permit means that this one of the cases where the compliance boundaries have not been shifted to the property boundary. It would seem particularly inappropriate on a large farm where you are only dealing with a lagoon or sprayfield operation that's likely to be a part of that farm. In any case, without any monitoring requirements, how is compliance to be assured that there are no violations up to the compliance boundary?

Response: Section 46 of Session Law 2013-413 amended G.S. 143-215.1(i) to include Compliance Boundary language that is specific to individual permits, and therefore not applicable to facilities covered under the proposed general permits. In addition, the statute is clear that nothing in the subsection shall be interpreted to require a revision to an existing compliance boundary previously approved by rule or permit. Groundwater monitoring is not required for these permitted facilities unless there is evidence of offsite groundwater impacts.

Comment 9: We have a lot encroachment from residential. That encroachment takes property from us every time they drill a well or build a house. The current permit says we are required to stay back 100 foot from any well. However, the county allows you to drill a well within 10 foot of property line. That means we lose 90 feet. Under our waste management plan, it says we are to stay 200 foot from a residence which falls under this permit guidance we have to follow animal waste permit/cattle waste management plan. That plan says 200 foot so we must maintain that distance. So we lose 190 feet when they build a house 10 foot from the property line, and we get no compensation for that property we lose.

Response: 15A NCAC 02C .0107(a)(2) Standards of Construction: Water Supply Wells requires a minimum horizontal separation between a well and the following potential sources of groundwater contamination at the time of well construction: 100 feet for

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industrial or municipal residuals disposal or wastewater-irrigation sites; and 100 feet for animal feedlots or manure piles. New water supply well construction must consider existing potential sources before well construction is allowed.

Setback requirements for animal waste application fields are established at the time the field is put into use. New homes being constructed adjacent to established, documented waste application fields would not require modifications to existing buffers for those fields.

V. THE WRITTEN COMMENTS

The comment period for these draft general permits remained open until December 6, 2013. During this period, a total of six written comments regarding the proposed permits were received. A summary of the written comments are provided in this document along with the corresponding responses to each comment. Division Staff prepared responses for each comment and used feedback from the Hearing Officers to ensure that permit relevant public concerns were addressed. All the written comments that were received are contained in Attachment 6.

Comment 10: Norman Jordan, on behalf of the North Carolina Dairy Producers Association, expressed concern that there are no additional changes made that would make it more difficult or expensive for dairy farmers to comply with the permits.

Response: This issue was addressed in the response to Oral Comment 2.

Comment 11: Anne Coan, on behalf of the North Carolina Farm Bureau Federation, submitted the following comments:

1. NC Farm Bureau opposes any additional changes to the permits that would make the permits more stringent or that would make compliance with the permits more costly or burdensome to the farmers.
2. It is important that cattle and dairy farmers understand that once a permit it rescinded they would not be allowed to go above the permitting threshold of 100 confined cattle without installing facility upgrades.

Response:

1. *Additional Modification: This issue is addressed in the response to Oral Comment 2.*
2. *Rescission notification: This issue is addressed in the response to Oral Comment 3.*

Comment 12: Keith Larick, on behalf of the North Carolina Department of Agriculture and Consumer Services, would oppose any additional changes to the permits that would increase the regulatory requirements.

Response: This issue was addressed in the response to Oral Comment 2.

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Comment 13: Jocelyn D'Ambrosia of Earthjustice, Gray Jernigan of Waterkeeper Alliance, and Chandra Taylor of Southern Environmental Law Center, on behalf of the Catawba Riverkeeper Foundation, Cape Fear River Watch, Neuse Riverkeeper Foundation, North Carolina Environmental Justice Network, Pamlico-Tar River Foundation, Waterkeepers Carolina, Western North Carolina Alliance, Winyah Rivers Foundation, and Yadkin Riverkeeper, Inc., submitted the following comments:

1. The general permits do not meet the non-discharge requirements; facilities under the permits are discharging significant nutrient and bacteria loads to watersheds across North Carolina. DENR must use the renewal period as an opportunity to assess whether facilities are complying with the permits and come up with alternative measures to control pollution from these facilities.

Response: General Permits are for non-discharge animal waste management systems in accordance with G.S. §143-215. Condition I.1 requires systems covered by these General Permits be effectively maintained and operated as non-discharge systems. The Division conducts inspections of all permitted animal operations annually to determine if the system is in compliance with its animal waste management plan and Permit as required by G.S. §143-215.10F. The Division may also conduct sampling as needed to determine if there are any violations of water quality standards, per Condition IV.1.d.

In response to the 2008 Petition for Rule-Making regarding monitoring at animal operations, the Division initiated a monitoring study conducted by the United States Geological Survey (USGS). The USGS collected samples in fifty-four watersheds to identify detectible contributions of pollutants from animal operations. The full report on the study including analysis and results is expected to be finalized and release later in 2014.

2. General permits should be modified to come into compliance with Title VI of the Civil Rights Act of 1964 in addressing the following.
    a. Swine facilities are disproportionately concentrated in communities of color. African American communities disproportionately bear the impact of swine facilities.
    b. Lagoon sprayfield systems can pollute nearby waters through lagoon breaches and spills, lagoon leakage into shallow groundwater, sprayfield runoff from over-applied waste or waste applied on saturated or frozen ground, waste directly applied into ditches, and waste blown into surface waters or neighboring homes during waste application.
    c. Air pollution from swine facilities adversely affects neighboring communities and can spread antibiotic-resistant bacteria, threatening human health. DENR should consider requiring facilities to install controls on confinement houses that filter the air.
    d. Proximity to swine facilities depresses property values.

Response:
2.a. – The General Permits cover existing swine facilities and existing operations that were previously permitted by the Division and are not portable; therefore, the renewal of

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these General Permits does not cause additional impacts to communities. Since 1995, all new swine operations have been subject to the Swine Farm Siting Act (G.S. §106-800) which establishes limitations on the siting of swine houses for permitted swine operations. In 2007, G.S. §143-215.10I made permanent the moratorium on the construction of new swine operations or the expansion of existing swine operations that employ a lagoon-sprayfield system as the primary method of waste treatment and disposal. Any new or expanding facilities permitted after that time must satisfy the Performance Standards for New/Expanding Swine Operation (G.S. §143-215.10I and 15A NCAC 02T .1307-1309 and 15A NCAC 02D .1808).

2.b. – There are statutes, rules, and permit conditions that address each of the concerns that were raised. Examples include the following:

- *Lagoon breaches and spills are prohibited under the General Permits. Permit Conditions I.1, II.1, II11-15, II.25, II.27, III.1-3, III.18, IV.1, and V.2 all directly address issues to prevent lagoon breaches and spills.*
- *Permitted lagoons are required to meet the current NC NRCS Conservation Practice Standard No. 359 – Waste Treatment Lagoon at the time of construction. Earthen structures for new/expanding swine operations must be designed and constructed with synthetic liners to eliminate seepage, 15A NCAC 02T .1307(1)(A).*
- *Permit Condition II.5 prohibits waste application at rates resulting in excessive ponding or any runoff.*
- *Condition II.21 prohibits the application of waste on saturated or frozen ground.*
- *The General Permits do not allow for discharges to ditches. Condition II.1 prohibits waste being directly applied to ditches.*
- *Condition II.19 prohibits waste from being applied such that it reaches surface waters or wetlands or crosses property lines or field boundaries.*

The Division conducts inspections of all permitted animal operations annually to determine if the system is in compliance with its animal waste management plan and Permit as required by G.S. §143-215.10F. The Division may also conduct sampling to determine if there are any violations of water quality standards.

2.c. – Permittees are required by G.S. §143-215.10C(e)(1) to develop and follow and Odor Control Checklist to reduce off-site odor impacts as a part of the CAWMP. Odor complaints related to animal operations are forwarded to and assessed by the Division of Air Quality. Site specific measures may be required based upon the findings of the Division of Air Quality. Some swine operations are voluntarily making modifications that improve air quality such as installing lagoon covers for methane capture and energy generation.

2.d. – The General Permits cover existing swine facilities. Since 1995, all new swine operations have been subject to the Swine Farm Siting Act (G.S. §106-800) which establishes limitations on the siting of swine houses for permitted swine operations including setbacks to occupied residences, schools, hospitals, churches, outdoor recreational facilities, national parks, State Parks, historic properties acquired by the state, child care centers, property boundaries, and wells.

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3. Condition I.1 – This condition does not protect against discharges. The 25-year/24-hour storm design standard is not as protective against discharge as it may have been in the past. The last paragraph of this condition appears to allow waste discharges to or from ditches. DENR should prohibit any discharge of waste from or application of waste to a ditch that drains to surface waters or wetlands.

Response: G.S. §143-215.10C(b) states that animal waste management systems shall be designed, constructed, and operated so that the system does not cause pollution in waters of the State except as may result due to a storm event more severe than the 25-year, 24-hour storm. The structures were required to be designed based upon the NRCS Standard in place at the time of construction. There is no requirement to modify structure design.

The Condition does not allow for the discharge or application of waste to ditches and further prohibits the discharge to surface waters or wetlands. The exception described in the last paragraph requires that discharges from the ditch be controlled by approved best management practices (BMPs); this refers to the hydrologic flow leaving the ditch, not a release of pollutants. However, should any waste reach the ditch, it is required to be removed immediately, and must be reported as a discharge to a ditch.

4. Condition I.3 – DENR should require assessments of the effectiveness of the Certified Animal Waste Management Plan (CAWMP) to be submitted quarterly or with the annual certification. These assessments should be made public. DENR should require permittees to submit all amendments to the CAWMP to the Division for approval.

Response: The records associated with assessment of the CAWMP's effectiveness are maintained as part of the facility's records and are reviewed by the Division during annual compliance inspections. These records include but are not limited to lagoon level records, irrigation records, rainfall records, soil sample analysis, waste analysis, and crop yield records. Records are maintained by the Permittee for a minimum of three years, per Condition III.11, and must be submitted to the Division upon request.

5. Condition I.5 – The Division should require all facilities in all watersheds to submit facility wide evaluations for phosphorous loss at least every three years. General permits should prohibit all facilities from applying waste on fields at rates that exceed the established crop removal rate for phosphorous, not just those with "HIGH" phosphorous-loss assessment rating.

Response: 15A NCAC 02T. 1304 specifically exempts State Permitted facilities from phosphorus requirements. However, facilities in watersheds that are sensitive to nutrient enrichment can be required to conduct phosphorus evaluations through 15A NCAC 02B.

G.S. §143-215.10C(e)(6) establishes that nitrogen shall be a rate limiting element and that phosphorous application comply with the nutrient management standard. NC manure nutrient application criteria as related to phosphorous-loss assessments are established by NC NRCS Conservation Practice Standard No. 590 – Nutrient Management which is the state technical standard for nutrient management.

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6. Condition I.6 – DENR should define the term "treatment units," and clarify that permittees may not circumvent the state law barring the construction, operation, or expansion of an animal waste management system that serves a swine farm that employs an anaerobic lagoon as the primary method of treatment.

Response: The addition of definitions involves rule changes and is not within the scope of this permit renewal process. The addition of treatment units refers to supplemental treatment processes in conjunction with the current treatment system, i.e. a solids separation unit. The Condition specifically requires Division approval for use. Condition I.4 specifically prohibits any expansion without meeting the requirements of the Performance Standards for New/Expanding Swine Operation (G.S. §143-215.10.I).

7. Condition I.7 – The permit should define the term "innovative treatment process" and clarify that permittees may not circumvent the state law barring the construction, operation, or expansion of an animal waste management system that serves a swine farm that employs an anaerobic lagoon as the primary method of treatment.

Response: The addition of definitions involves rule changes and is not within the scope of this permit renewal process.

Condition I.4 specifically prohibits any expansion without meeting the requirements of the Performance Standards for New/Expanding Swine Operation (G.S. §143-215.10.I). The pilot testing of an innovative treatment process does not supersede this requirement.

8. Condition I.8 – The permit should increase the setback for private wells to at least 500 feet, impose setback for public or community wells of at least 1,000 feet, and impose setback to protect waters that have high recreational use as well as designated high quality waters.

Response: This issue is addressed in the response to Oral Comment 4.

9. Condition II.7 – This condition should be amended to require manure and sludge to be incorporated into the soil within twelve hours of application to bare soils.

Response: The Division feels that the requirement for sludge applied to bare fields be incorporated before the next rain event, in addition to the current two-day maximum is appropriate. The two-day maximum is consistent with the Ninth Senate Bill 1217 Interagency Group Guidance Document, Sept. 2009.

10. Condition II.10 – DENR should ensure that the North Carolina Department of Agriculture and Consumer Services (NCDA&CS) Veterinary Division's statutes and regulations protect the environment and promulgate additional regulations if needed. The permit should define "normal mortality rates" for each facility and require reporting of all die-offs in excess of those rates within 24 hours. Permittees should consult with the Division about appropriate burial locations

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along with the dates and number of animals buried by species and type. The Division should also require groundwater monitoring for each burial site.

Response: It is outside of the purview of the Division to revise or promulgate new regulations that are under the authority of the NCDA&CS Veterinary Division granted by General Statutes Chapter 106, Article 34.

G.S. §143-215.10C(e)(3) requires Permittees to develop a mortality management plan as a part of their CAWMP. Permittees are further required to maintain stocking (and mortality) records. Division Staff does not recommend a 24-hour reporting requirement.

This Condition does require that burial be done in consultation NCDA&CS Veterinary Division, that the location be mapped, and that map provided to the Division along with records of dates and numbers of animals buried by species and type. The Condition also provides for groundwater monitoring as determined by the Division.

11. Condition II.12 – Permit should specify that the protective vegetative cover must be designed to prevent the berms and embankments from eroding.

Response: The purpose of a protective cover is the prevention of erosion. The maintenance of this protective cover and the condition of embankments, berms, pipe runs, and diversions are a part of the annual inspection that the Division conducts as required by G.S. §143-215.10F. Staff does not recommend any changes to the Permit language.

12. Condition II.17 – The permit should not incorporate an open-ended affirmative defense to potentially dangerous discharges. The permit should define circumstances that are considered "beyond the Permittee's control" to not include preventable accidents or operator error.

Response: The Division feels that the affirmative defense provision is appropriate. There are very few situations where an operator would be unable to perform the 120-minute inspection, and claim this provision. The Division does have the authority to refute the affirmative defense assertion if necessary.

13. Condition II.22 – This condition should be strengthened to require land application cease at least twenty-four hours before National Weather Service predicts, with 80% certainty, that there will be two inches or more of rainfall in the county in which the facility is located. Permit should also prohibit land application for at least twenty-four hours after rainfall of two inches or more. Recommends a twenty-four hour cessation period prior to a tropical storm or hurricane; the current four hour cessation period does not give waste time to incorporate into soil.

Response: The Condition requires Permittee to consider pending weather conditions when making decisions regarding land application of waste and to record the weather conditions. Forecasts of rainfall of two inches or more as well as the timing would need

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to be considered. The Division does not recommend language changes regarding cessation of waste application prior to storm events.

In actual practice, field conditions in the twenty-four hours following a two inch rainfall event typically prohibit the application of waste; the ground is often too wet for equipment to cross the field. Additionally, Condition II.21 prohibits application of waste on flooded or saturated land, and Condition II.5 prohibits application that results in excessive ponding or runoff. Based upon these permit conditions, the Division does not recommend any language changes regarding a twenty-four hour prohibition of application of waste following a rainfall of two inches or more.

The Condition requires application of waste cease within four hours of the National Weather Service (NWS) issuance of Hurricane/Tropical Storm Warnings or Flood Watch associated with a Hurricane/Tropical Storm. The NWS issues these watches and warnings twenty-four hours prior to the storm event. The four hour window after issuance of said watches/warnings provides operators time to receive notification and cease waste application. This also allows at least twenty hours for the waste to incorporate into the soil.

14. Condition II.24 – Calibration should be required at least once every six months and results of testing submitted to Division.

Response: The Division feels that the current calibration frequency is appropriate. This issue is further addressed in the response to Oral Comment 1.

15. Condition II.26 – Permit should prohibit the storage of crops in bales around the exterior of sprayfields/crop fields.

Response: The storage of hay bales on field edges is a common agricultural practice not exclusive to waste application fields. The inspection process also addresses any situation when bales are not being utilized or removed. Division Staff does not recommend any language change.

16. Condition II.27 – Permit should require the Division approval prior to lowering lagoon levels below designed stop pump levels and should clarify that this does not override Condition II.22.

Response: Division notification is not necessary. Provisions for temporary lowering of lagoon levels below stop pump levels are in the NC NRCS Conservation Practice Standard No. 359 – Waste Treatment Lagoon, the state technical standard.

17. Condition III.1 – DENR should provide Permittees guidance on how to inspect lagoons, require broader installation and use of monitoring wells or an evaporation pan to determine lagoon seepage loss, or require third party testing for lagoon seepage.

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Response: Permittees are required to do a visual inspection to look for signs of erosion, leakage, damage or discharges as a part of their monthly inspection. Division staff also inspects the embankments during the annual inspection process. The inspector informs the Permittee of any areas of concern and recommends corrective actions. Technical assistance from NRCS or private consultants is available to advise Permittees on addressing such issues.

Monitoring wells may be required as determined by the Division, per Condition III.10. Division Staff does not recommend any changes to the Permit language.

18. Condition III.5 – Waste sample analysis should be required prior to application, not 60 days before or after application.

Response: This issue is addressed in the response to Oral Comment 6.

19. Condition III.9(f) – Sampling of source lagoon/storage pond should be required within twelve hours. Sampling of water receiving the discharge should also be sampled for the parameters listed within twelve hours. Sample handling practices should be specified, and samples taken to a certified laboratory. Monitoring results should be submitted within fifteen days and made public, rather than within thirty days.

Response: This issue is addressed in the response to Oral Comment 7.

Thirty days is appropriate to obtain and submit sampling data. All reports received by the Division are public record.

20. Condition III.11 – Records retention should be for five years not three years. Once every five years DENR should conduct a full compliance inspection of the facility and records.

Response: The Division conducts a full compliance inspection annually for each facility covered under these General Permits as required by G.S. §143-215.10F. All records within the required retention schedule must be made available during the inspection or submitted upon request, per Condition III.12. Division staff does not recommend any changes to the current retention schedule.

21. Condition III.14 – All permittees should be required to file an annual compliance report regardless of compliance history.

Response: The Division conducts inspections of all permitted animal operations annually as required by G.S. §143-215.10F. All records required by this Permit are reviewed by the Division during the inspection. Condition III.12 further requires the Permittee to submit any records or reports within fifteen days of request by the Division. This Condition reserves the right for the Division to require an annual report.

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22. Condition III.15 to III.17 – Terminology should be consistent across these three conditions and tie to the discharge of waste. Press release requirement in Condition III.15 should be within twenty-four hours and specify contents of the press release. Condition III.17 should be made clear that discharges of 1,000,000 gallons or more require press release and public notice be expanded to included appropriate counties recommended by the Division. Permittees should be required to contact the Division within twelve hours of a discharge of 5,000 gallons or more. Permittees should be required to maintain a copy of the press release and public notice for up to one year and to provide the Division with a copy of the notice and proof of publication.

Response: The Division agrees that the terminology should be consistent across the three Conditions. It is recommended that all three Conditions use the term "animal waste"; this is also consistent with G.S. §143-215.10C(h).

The requirement to issue a press release within forty-eight hours of a discharge of 1,000 gallons or more of animal waste to surface waters of the State is a requirement of G.S. §143-215.10C(h)(1) and cannot be changed by this process.

The requirement to publish a notice of the discharge of 15,000 gallons or more of animal waste to surface waters of the State is a requirement of G.S. §143-215.10C(h)(2) and cannot be changed by this process. The publication of a public notice is in addition to the above press release requirement.

It is recommended to add the following two sentences from G.S. §143-215.10C(h)(2) be added to Condition III.16 – "The notice shall be captioned "NOTICE OF DISCHARGE OF ANIMAL WASTE" and "The owner or operator shall file a copy of the notice and proof of publication with the Department within thirty (30) days after the notice is published. Publication of a notice of discharge under this Condition is in addition to the requirement to issue a press release under Condition III.15".

It is recommended to correct the last sentence in Condition III.17 to say "A copy of all public notices and proof of publication must be sent to the Division within thirty (30) days of the after the notice is published."

23. Condition III.18 – Two years is too long for a facility to comply with sludge removal. Compliance should be within one year, rather than two. Facilities that are not able to manage its waste should not be allowed to generate more.

Response: The Division feels that the compliance schedule is appropriate as written. Permittees must identify additional application fields and comply with the application windows for various crops. The Condition does require a Plan of Action be developed within ninety days of determination of the need or sludge removal.

24. Condition IV.1 – Permit should state that facilities are subject to random, unannounced inspections.

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Response: The Condition does not preclude random, unannounced inspections. The Division feels that the current wording is appropriate.

25. Condition V.13 – Permit should provide requirements for how systems are to be closed. Depopulated facilities should be required to maintain a permit and inspect the lagoon to ensure it is not leaking. Reopening facilities should have to demonstrate compliance with performance standards in G.S. 143-215.10I. Facilities depopulated due to forced closure or enforcement should develop a plan that rectifies past violations.

Response: Abandoned facilities are held to the conditions of this Permit until lagoon closure. As for the issue of reactivation of abandoned farms, that is addressed by 115A NCAC 02T .1302. Lagoon closure is addressed in Condition V.3, 15A NCAC 02T .1306, and NC NRCS Conservation Practice Standard No. 360 "Closure of Waste Impoundment."

26. Information Collection – Permits should be revised to require all information collected be submitted to DENR quarterly and made readily accessible to the public via a database.

Response: The Division conducts inspections of all permitted animal operations annually as required by G.S. §143-215.10F. All records required by this Permit must be submitted to the Division during the inspection for review. Condition III.12 further requires the Permittee to submit any records or reports within fifteen days of request by the Division. This Condition reserves the right for the Division to require an annual report.

27. DENR should require dry litter poultry facilities to operate under a permitting program. DENR should repeal the permitting by regulation rules applicable to dry litter poultry facilities. At a minimum, facilities that violate the regulations for deemed permitted status to obtain coverage under an individual or general permit.

Response: The General Permits presented for public review and comment are renewals of existing general permits. The introduction of a new general permit for a permitted activity should be addressed in a separate action. At this time, the Division has not received any requests for permit coverage from a dry litter poultry operation. If such a request is received, an individual permit can be issued in compliance with all applicable statutes and regulations. A general permit could be developed if multiple dry litter poultry facilities seek coverage.

Comment 14: Steve Wing, Ginger T. Guidry, Sarah Hatcher, and Jessica Rinsky of the UNC-CH School of Public Health submitted the following comments:

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1. Negative health impacts of industrial swine operations result from the use of lagoons and sprayfields to manage animal waste. Heath impacts are related to air pollution from barns, lagoons, and sprayfields.

Response: This issue was addressed the response to Comment 13.2.c.

2. Non-therapeutic use of antibiotics in swine production results in negative health impacts.

Response: The Division does not possess the authority to regulate the use of antibiotics in swine production. The General Permits are for non-discharge animal waste management systems in accordance with G.S. §143-215 for the protections of human health and the environment. More research and data is needed regarding emerging contaminants such as pharmaceuticals before limitations could be placed on these parameters. Establishment of such limits would be done through the legislative or rule-making process.

3. The location of confinements and animal waste in flood plains results in negative health impacts.

Response: The Swine Farm Siting Act, G.S. §106-803(a2), prohibits any component of the animal waste management system other than a land application site from being located in the 100 year flood plain. The NCDA&CS Division of Soil & Water Conservation operate a swine farm buyout program from 2000 to 2014. This program

4. The disproportionate burden of animal feeding operations impacts on communities particularly susceptible due to other environmental exposures and inadequate access to medical services.

Response: This issue was addressed the response to Comment 13.2.a.

5. DENR should compile electronic records of information that permittees are required to collect and make them publicly available.

Response: This issue was addressed the response to Comment 13.26.

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VI. REVISED STATE GENERAL PERMITS

As a result of the public comments received and further information gathered by the Division during the course of the public comment period, the Division produced revised State General Permits that incorporate the Hearing Officers' recommendations previously discussed in this report. The revised permits are provided as Attachment 7.

VII. RECOMMENDATION

Based upon the information contained in this report, consideration of the comments received, a thorough review of all the information and facts that are pertinent to the development of these permits, and an analysis of the revised permits, the Hearing Officers make the following recommendation:

- The Director should adopt the revised permits contained in Attachment 7. These permits should be issued with an effective date of October 1, 2014.
- Prior to the next renewal period, the Division should re-examine the 2002 protocol for groundwater monitoring around CAFOs to determine whether the 2002 protocol provides adequate protection of human health and the water resources of the state.
- Prior to the next renewal period, the Division should evaluate whether Tropical Storms and Hurricanes are the only extreme rainfall event that should be specifically addressed by the general permit.
- As a part of the rule review process required by Session Law 2013-413, the Division should consider whether rule changes are necessary to address those comments that the Division felt were more appropriate to address through a rulemaking process.

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Office of Civil Rights
REACH Case Protocol Meeting
March 14, 2015 · 11:30 a.m. – 12:30 p.m.
WJC North Conference Room 2530

Conference Number: Ex. 6 - Personal Privacy

Agenda

I. Roll Call

II. Opening Remarks

III. Draft RFI

IV. Interview with Dr. Steve Wing

V. Next Steps

- Finalize and send RFI to NC DEQ
- Interview Dr. Steve Wing
- Develop strategy for Informal Resolution
- Ex. 5 - Deliberative Process

Notes

- _____
- _____
- _____

Industrial Hog Operations in North Carolina
Disproportionately Impact African-Americans, Hispanics and American Indians

Steve Wing and Jill Johnston
Department of Epidemiology
The University of North Carolina at Chapel Hill
August 29, 2014

Summary

Background: In 2014, the North Carolina Department of Environment and Natural Resources (NC-DENR) issued a swine waste management general permit (the General Permit), which is expected to cover more than 2,000 industrial hog operations (IHOs). These facilities house animals in confinement, store their feces and urine in open pits, and apply the waste to surrounding fields. Air pollutants from the routine operation of confinement houses, cesspools, and waste sprayers affect nearby neighborhoods where they cause disruption of activities of daily living, stress, anxiety, mucous membrane irritation, respiratory conditions, reduced lung function, and acute blood pressure elevation. Prior studies showed that this industry disproportionately impacts people of color in NC, mostly African Americans.

Methods: We obtained records on the sizes and locations of permitted IHOs from NC-DENR and calculated the steady state live weight (SSLW) of hogs as an indicator of the amount of feces and urine produced at each IHO. We obtained block-level information on race and ethnicity from the 2010 census of the United States. We compared the proportions of people of color (POC), Blacks, Hispanics, and American Indians living within 3 miles of an IHO to the proportion of non-Hispanic Whites. We quantified relationships between race/ethnicity, presence of one or more IHOs, and the SSLW of IHOs, using Poisson regression and linear regression to adjust for rurality.

Results: Analyses based on a study area that excludes the state's five major cities and western counties that have no presence of this industry show that the proportion of POC living within 3 miles of an industrial hog operation is 1.52 times higher than the proportion of non-Hispanic Whites. The proportions of Blacks, Hispanics and American Indians living within 3 miles of an industrial hog operation are 1.54, 1.39 and 2.18 times higher, respectively, than the proportion of non-Hispanic Whites ($p<0.0001$). In census blocks with 80 or more percent people of color, the proportion of the population living within 3 miles of an industrial hog operation is 2.14 times higher than in blocks with no people of color. This excess increases to 3.30 times higher with adjustment for rurality. Adjusted for rurality, the SSLW of hogs within 3 miles of a census block increases, on average, 100,000, 64,000, 243,000, and 93,000 pounds for every 10 percent increase in POC, Black, Hispanic, and American Indian population ($p<0.0001$).

Conclusions: IHOs in NC disproportionately affect Black, Hispanic and American Indian residents. Although we did not examine poverty or wealth in this study, the results are consistent with previous research showing that NC's IHOs are relatively absent from low-poverty White communities. This spatial pattern is generally recognized as environmental racism.

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Background

Swine production in North Carolina (NC) changed dramatically during the last decades of the 20th century. Between 1982 and 2006 the number of hog operations in the state declined precipitously while the hog population increased from approximately 2 to 10 million (Edwards and Driscoll 2009). Production became concentrated in eastern NC (Furuseth 1997).

Traditional NC producers raised small numbers of hogs, commonly fewer than 25, and hogs were one of several commercial crops on diversified farms (Edwards and Driscoll 2009). In contrast, industrial producers raise large numbers of hogs, often many thousands, in confinement houses that are designed to vent toxic gases and particles into the environment. Animal wastes are flushed into open cesspools and then sprayed on nearby fields. Pollutants emitted by IHOs include hydrogen sulfide, ammonia, a wide array of volatile organic compounds, and bioaerosols including endotoxins and other respiratory irritants (Cole et al. 2000) (Schiffman et al. 2001).

The negative impacts of particles and gases inside IHO confinements on worker health have been extensively described (Cole et al. 2000; Donham 1993; Donham et al. 1995; Donham et al. 2000; Donham 1990). Environmental pollutants from IHOs affect people who are more susceptible than workers due to young or old age, asthma or allergies, or other conditions. An extensive body of peer-reviewed scientific evidence shows that IHOs release contaminants into neighboring communities where they affect the health and quality of life of neighbors. Many of these studies have been conducted in NC. Hydrogen sulfide concentrations within 1.5 miles of IHOs in NC are associated with neighbors' ratings of hog odor and inability to engage in routine daily activities (Wing et al. 2008), increased stress and anxiety (Horton et al. 2009), irritation of the eyes, nose and throat, respiratory symptoms (Schinasi et al. 2011), and acute elevation of systolic blood pressure (Wing et al. 2013). A study of NC public middle school children who participated in an asthma survey, which was conducted by the NC Department of Health and Human Services, found that children attending schools within three miles of an IHO had more asthma-related symptoms, more doctor-diagnosed asthma, and more asthma-related medical visits than students who attended schools further away (Mirabelli et al. 2006). The same study reported a 23% higher prevalence of wheezing symptoms among children who attended schools where staff reported noticing livestock odor inside school buildings twice or more per month compared to children who attended schools where no livestock odor was reported (Mirabelli et al. 2006). Other studies in NC (Tajik et al. 2008) (Wing and Wolf 2000) (Bullers 2005) (Schiffman et al. 1995) and elsewhere (Donham et al. 2007) (Thu et al. 1997) (Radon et al. 2007) also document negative impacts of IHO air pollution on neighbors' health and quality of life.

Liquid contaminants from IHOs are released to the environment through leakage of animal waste storage pits, runoff from land application of liquid wastes, atmospheric deposition, and failure of the earthen walls of waste pits (Burkholder et al. 2007). Overflow of waste pits during heavy rain events results in massive spills of animal waste into neighboring communities and waterways. For example, in late September, 1999, 237 NC IHOs were located in flooded areas identified from satellite imagery provided by the NC Division of Emergency Management (Wing et al. 2002). Parasites, bacteria, viruses, nitrates, and other components of liquid IHO waste pose threats to human health (Burkholder et al. 2007; Cole et al. 2000).

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Routine use of sub-therapeutic doses of antibiotics to promote weight gain of hogs promotes antibiotic resistance, making infections in humans more difficult to treat (Silbergeld et al. 2008). Airborne bacteria, including antibiotic resistant strains, have been isolated from IHO air emissions (Schulz et al. 2012) (Green et al. 2006) (Gibbs et al. 2006), and antibiotic resistant bacteria are associated with animal vectors near industrial animal operations, including flies (Graham et al. 2009), rodents (van de Giessen et al. 2009), and migratory geese that land on NC's IHO liquid waste pits (Cole et al. 2005). A recent medical records study from Pennsylvania shows that people living near IHO liquid waste application sites have elevated rates of infection with methicillin resistant *Staphylococcus aureus* (Casey et al. 2013). NC industrial livestock workers carry strains of *Staphylococcus aureus* that are associated with swine, including antibiotic resistant strains (Rinsky et al. 2013). These bacteria could be spread by liquid waste and airborne particles.

Using information from the United States Census of 1990 and locations of IHOs reported by the North Carolina Department of Environment and Natural Resources (NC-DENR) in 1998, we showed that the state's IHOs were disproportionately located in areas where more people of color (POC), primarily African Americans, live (Wing et al. 2000). We concluded that their disproportionate location in communities of color represented an environmental injustice. Since 1998 additional IHOs have obtained permission to operate and others are no longer in business. Additionally, between 1990 and 2010 the state's population size and spatial distribution changed due to births, deaths and migration. In this report we update our previous findings by evaluating whether IHOs operating under the general permit issued on March 7, 2014, will disproportionately impact POC, Blacks, Hispanics, and American Indians.

Materials and Methods

Lacking a list of the unique IHOs operating under the General Permit finalized in 2014, we used a list of all permitted industrial animal operations provided by NC-DENR on January 24, 2013 that we had prepared for prior research. First we excluded all non-swine operations from the list. Next we excluded swine operations with expired permits and permits with an allowable head count equal to zero. We also excluded permits that did not appear on a list of permitted animal operations published by DENR in January, 2014. We merged multiple permits issued for the same facilities to obtain a total head count for each operation. However the head count may be misleading as a measure of the pollution from each IHO because some facilities primarily house small pigs while others primarily house large hogs. We therefore calculated each facility's total steady state live weight (SSLW) using NC-DENR's formula based on the number and average weight of each growth stage of swine permitted at the facility. We interpret SSLW as a summary measure of the feces and urine produced by the swine of different growth stages at each facility.

Following the protocol provided in our previous study we excluded facilities operated by research institutions because they are subject to different location and management decisions than are commercial operations (Wing et al. 2000). Finally, we excluded facilities that do not hold a certificate of coverage to operate under the General Permit because they operate under individual permits or National Pollutant Discharge Elimination System general permits. The resulting facilities should closely approximate those expected to seek to continue operating under

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the renewed General Permit. The renewed General Permit takes effect on October 1, 2014, at which time we plan to update the list created for this research.

The vulnerability of people of any race/ethnicity to having polluting facilities nearby can be affected by the race and ethnicity of other people in their community. For example, African-Americans who live in areas primarily populated by non-Hispanic Whites have, generally, a lower susceptibility to being near polluting facilities than African-Americans who live in areas primarily populated by Hispanics or American Indians. We therefore conducted our primary analyses of disproportionate impact using the POC category. We also conducted analyses for specific racial/ethnic categories. We defined the following racial/ethnic categories: non-Hispanic White (non-Hispanics who identified as White and no other race), POC (all people not categorized as non-Hispanic white), Black (people who identified themselves as African-American or Black with or without any other race), Hispanic of any race, and American Indian (people who identified themselves as American Indian with or without any other race). We used block-level race/ethnicity-specific population counts from the US Census of 2010.

As large-scale agricultural facilities, IHOs are not located in major cities. Following the protocol adopted in our prior research, we defined a study area for our primary analyses that excluded census blocks in the five major metropolitan areas of NC (Charlotte, Winston Salem, Greensboro, Durham and Raleigh) as well as 19 western counties that neither have an IHO nor border a county that has an IHO. We conducted additional analyses for the entire state.

We considered residents of blocks to be affected by IHOs within three miles of the block centroid. Blocks were categorized as either having, or not having, an IHO within three miles. Additionally, we calculated the total permitted SSLW of hogs within three miles of the centroid of each block as a measure of the total potential influence of pollutants from nearby IHOs on the residents of the block.

As in our prior study, we also calculated the population density of each block, defined as the number of people per square mile. Population density is a measure of rurality, which is strongly related to the availability of land for agriculture and the price of land. Racial/ethnic groups in NC differ in their urban vs. rural residence, making them differentially susceptible to types of polluting facilities that locate in rural vs. urban locations. For example, a larger proportion of non-Hispanic Whites in NC live in remote rural areas than do Blacks, the racial comparison is affected not only by the susceptibility of Whites vs. Blacks to IHOs, but also by differences in whether they live in rural vs. urban areas. By adjusting for population density (or rurality), we compare racial vulnerability to IHOs for racial groups within each level of rurality. This adjustment is analogous to other statistical adjustments in epidemiology, as when the death rates of two countries are compared: even though death rates at every age may be higher in a poor than a rich country, the poor country may have a lower overall death rate simply because it has a younger age distribution. In that case, age-adjustment is used to compare mortality in the two countries just as we use density-adjustment to compare the proximity to IHOs in areas with different racial/ethnic make-up.

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We used weighted Poisson regression to quantify relationships between race/ethnicity and the presence of one or more IHOs within three miles of a block. We used weighted linear regression to quantify relationships between race/ethnicity and the SSLW of hogs permitted within three miles of a block. We used census block populations as weights. In density-adjusted models we included variables for the natural log of population density raised to the first, second and third power. As in our prior analysis, this cubic model fit the data well and additional power terms added little to the model fit (Wing et al. 2000). For the two largest racial/ethnic groups other than non-Hispanic Whites, POC and Blacks, we categorized race/ethnicity in groups of blocks 20% in width compared to blocks with no POC using indicator variables. Due to smaller numbers in these categories we did not fit models with indicator variables for Hispanics and American Indians. We also considered the percent of population of each race/ethnicity as a continuous variable, estimating the added burden of IHOs for a 10% increase in the population.

This study involves neither random sampling nor randomization of exposure to IHOs, therefore statistical significance testing is inappropriate and confidence intervals do not correspond to the probability that the true values of measures of association are within the interval. However, the US-EPA considers statistical significance in its assessment of environmental racism. We therefore report p-values for differences in proportions of each racial/ethnic group within 3 miles of an IHO using t-tests. We report 95% confidence intervals (CIs) as measures of precision of the associations estimated from regression models. 95% CIs that exclude the null value (1.0 for ratios and 0.0 for differences) are commonly considered to be statistically significant at $p<0.05$.

Results

We estimate that 2,055 IHOs were operating under the General Permit in January 2014, and that they were permitted to house approximately 1.2 billion pounds of swine (Table 1). The 160 (7.7%) IHOs permitted to house between 20 and 100 thousand pounds accounted for only 1% of the total permitted SSLW. The 342 (17.2%) IHOs permitted to house between 1 and 10.2 million pounds accounted for 46.5% of the total.

Table 2 shows that there are over 6.5 million residents of the study area. Approximately 986,000 (15.1%) of these live in census blocks whose centroid is within 3 miles of an IHO that operates under the General Permit. This includes 602,380 non-Hispanic Whites and 383,522 POC. 13.1% of non-Hispanic Whites and 19.9% of POC in the study area live in blocks within 3 miles of an IHO.

Based on the study area population in Table 2, Table 3 shows ratios of percentage of POC living within 3 miles of an IHO compared to the percentage of non-Hispanic Whites living within 3 miles of an IHO. The percentage of POC living within 3 miles of an IHO is 1.52 times higher than the percentage of non-Hispanic Whites. The percentages of Blacks, Hispanics and American Indians living within 3 miles of an IHO are 1.54, 1.39 and 2.18 times higher, respectively, than non-Hispanic Whites. If residents of the study area had been randomized to live within 3 miles of an IHO, the probabilities of observing differences of these magnitudes or greater are less than 0.0001; the observed differences are considered to be highly statistically significant.

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We calculated these same ratios based on the entire state population of 9,535,483. The percentages of POC, Blacks, Hispanics and American Indians living within 3 miles of an IHO are 1.38, 1.40, 1.26 and 2.39 times higher than the percentage of non-Hispanic Whites, respectively. These ratios are considered to be highly statistically significant.

Figure 2 shows the percent of people living within 3 miles of an IHO in relation to the percent of people of color in blocks. In areas with less than 20% POC, just over 10% of the population lives within 3 miles of an IHO. In areas with 60-80% POC, over 20% of the population lives so close to an IHO. In areas with more than 80% POC, more than a quarter of the population lives within 3 miles of an IHO.

Table 4 presents ratios of the percent of people living within 3 miles of an IHO in blocks with >0 to <20%, 20 to <40%, 40 to <60%, 60 to <80% and 80 to 100% POC compared to blocks with no POC. The total population in these categories ranges from 526,305 in blocks with 60 to <80% POC to 2,577,015 in blocks with >0 to <20% POC. Ratios are statistically significantly elevated for all areas with more than 40% POC with or without adjustment for rurality. Ratios on the right side of Table 4 are adjusted for rurality. These ratios increase with the percentage POC. The highest ratios occur in areas with more than 80% POC, where over three times as many people live near IHOs, adjusted for rurality, compared to areas with no POC. These excesses are considered to be highly statistically significant.

Table 5 shows the results of analyses for Blacks parallel results to in Table 4 for all POC. Although ratios are somewhat lower for Blacks than POC, the percent of people living within 3 miles of an IHO is statistically significantly elevated in all groups of blocks that are more than 40% Black, with or without adjustment for rurality. In areas that are 80% or more Black, twice as many people live within 3 miles of an IHO compared to areas with no Blacks, a disparity that increases to three times more with adjustment for rurality. These excesses are considered to be highly statistically significant.

Table 6 presents the increased percent of the population living within 3 miles of an IHO for each additional 10 percent of the population of POC, Blacks, Hispanics, and American Indians. This analysis is similar to the results in Tables 4 and 5, but rather than using categories, the relationship between race/ethnicity and proximity to IHOs is modelled as a linear function. For every ten percent increase in POC, the proportion of people residing within 3 miles of an IHO increases, on average, by 10.7%. These values are 9.4, 8.5, and 16.2 for Blacks, Hispanics, and American Indians, respectively. Adjusting for rurality, 14.8% more people reside within 3 miles of an IHO for each additional ten percent POC. Adjusted values are 13.0, 16.3 and 11.8 for Blacks, Hispanics and American Indians, respectively. These linear relationships between race/ethnicity and living near IHOs are considered to be highly statistically significant.

Table 7 shows the difference in SSLW of hogs within 3 miles of residents of blocks with >0 to <20%, 20 to <40%, 40 to <60%, 60 to <80% and 80 to 100% POC compared to blocks with no POC. Blocks in categories with more than 20% POC have, on average, between 177 and 510 thousand pounds more hogs within 3 miles than blocks with no POC. Adjusting for population density, blocks with more than 60 percent POC have, on average, more than three-quarters of a

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million pounds more hogs permitted within 3 miles than areas with no POC. These excesses are considered to be highly statistically significant.

Table 8 presents parallel results for percentage Black population. As for POC, areas with more than 20% Black residents have an excess SSLW of hogs compared to areas with no Black residents, and differences are greater with adjustment for rurality. Adjusted for population density, blocks with more than 40% Black residents have between 493,000 and 620,000 more pounds of hogs within 3 miles than areas with no Black residents. These excesses are considered to be highly statistically significant.

Table 9 provides the average additional SSLW of hogs permitted in areas with POC for each percent increase in specific racial/ethnic categories. Adjusted for population density, the permitted SSLW of hogs within 3 miles of blocks increases 100, 64, 242, and 92 thousand pounds for each ten percent increase in POC, Black, Hispanic, and American Indian population, respectively. These linear relationships between race/ethnicity and SSLW are considered to be highly statistically significant.

Figure 3 depicts the data analyzed above. Each dot represents an IHO that was operating under the General Permit in 2014. IHOs are concentrated in NC's Coastal Plain Region, between the Piedmont and Tidewater. The red areas of Figure 3 indicate that this region has more people of color than other parts of the study area.

Conclusion

IHOs operating under the NC-DENR General Permit in 2014 are disproportionately located near communities of color. The disparities are considered to be highly statistically significant for Blacks, Hispanics, American Indians, and all POC. IHOs pollute local ground and surface water. They routinely emit air pollutants that negatively impact the quality of life and health of nearby residents. In addition to their well-documented effects on physical, mental and social well-being, residents of areas with a high density of IHOs, and especially residents of color, have been subjected to intimidation including threats of legal action, violence, and job loss (Wing 2002). The industry's close ties with local and state government officials help it to avoid regulation that could protect neighbors, and creates barriers to democracy in rural communities of color (Thu 2001, 2003). These discriminatory impacts could be reduced by decreasing the density of production and use of technologies that prevent releases of pollutants.

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Figure 1
North Carolina study area, 2014

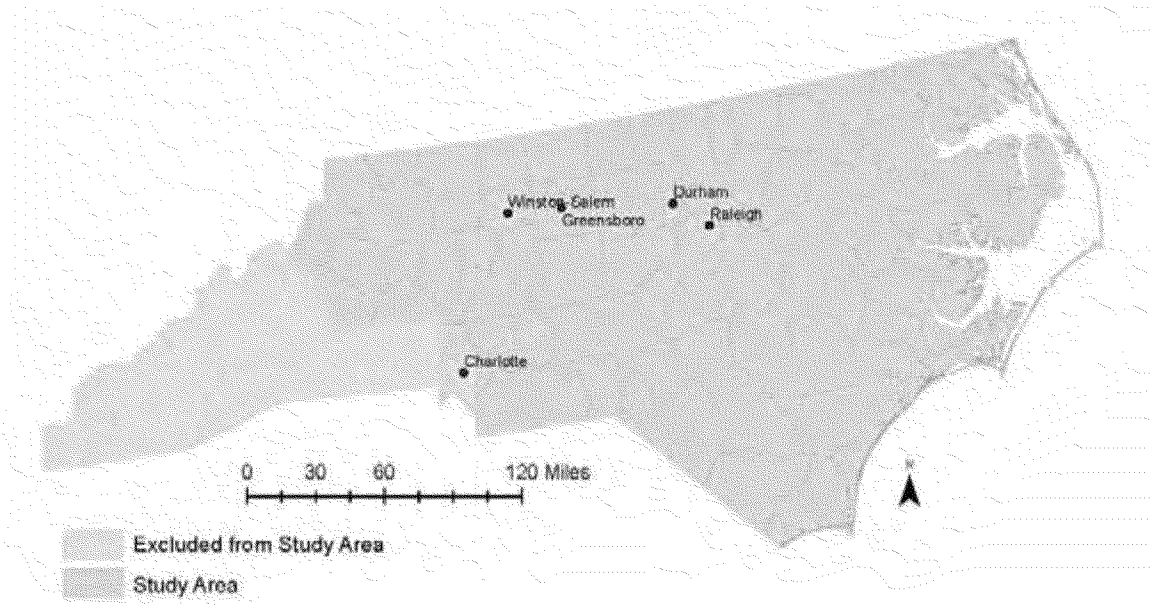

Figure 2
Percent of population living within 3 miles of an IHO
in relation to percent people of color, NC, 2014

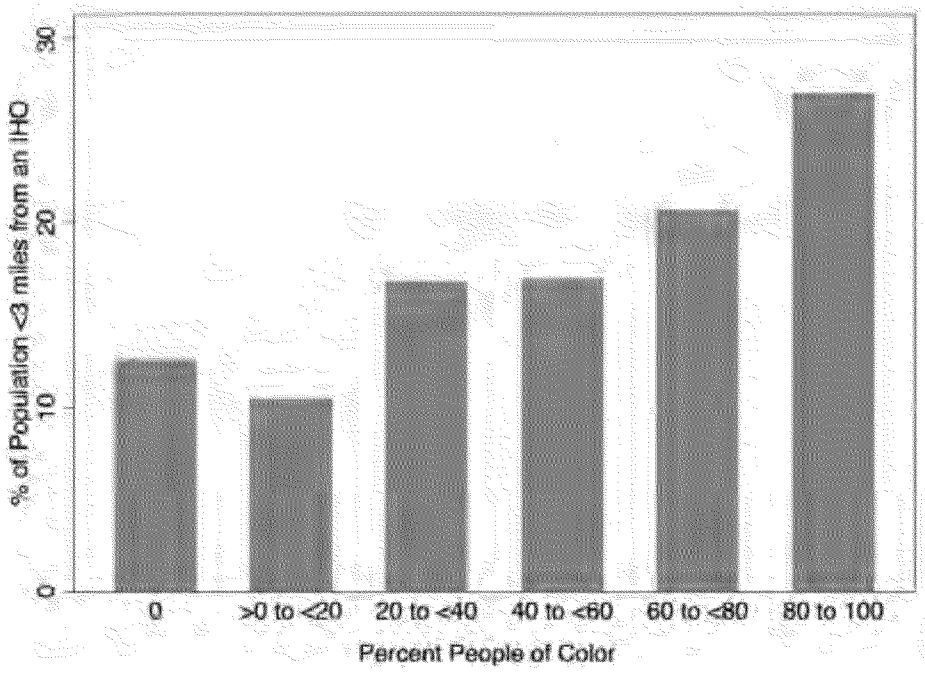

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Figure 3
Racial and ethnic composition of census blocks and the locations of NC IHOs operating under the General Permit, 2014

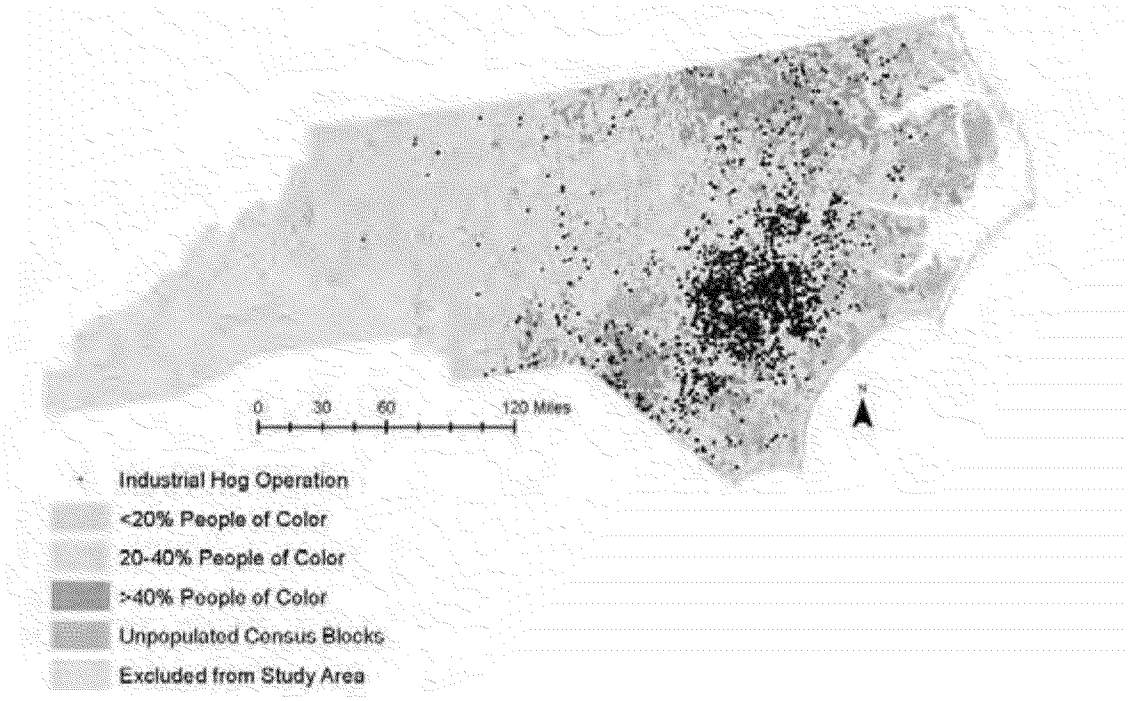

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Table 1
Steady state live weight of IHOs
operating under the General Permit, NC, 2014

Permitted SSLW[1]	Number of IHOs	Percent of IHOs	Total SSLW[1]	Percent of total SSLW
20-	160	7.7	12,574	1.0
100-	447	21.6	76,626	5.9
250-	577	28.1	222,003	17.1
500-	529	25.4	383,918	29.6
1,000-10,200	342	17.2	603,354	46.5
Total	2055	100.0	1,298,474	100.0

[1]Thousands of pounds

Table 2
Racial and ethnic composition of NC census blocks within 3 miles
of an IHO and more than 3 Miles of an IHO, 2014

	[illegible]		>3 miles from an IHO		
Racial Category	Number	Percent	Number	Percent	Total[1]
Non-Hispanic white	602,380	13.1	4,003,455	86.9	4,605,835
POC[1]	383,522	19.9	1,548,276	80.1	1,931,798
Black	277,199	20.2	1,096,795	79.8	1,373,994
Hispanic	92,679	18.1	418,292	81.9	510,971
American Indian	40,621	28.5	101,872	71.5	142,493
Total[1]	985,902	15.1	5,551,731	84.9	6,537,633

[1]POC can be counted in more than one racial/ethnic category. The total population is equal to the number of non-Hispanic Whites plus the number of POC.

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Table 3
Ratios of POC compared to non-Hispanic Whites living within 3 Miles of an IHO operating under the General Permit, 2014

Racial/ethnic Category	Population	Number	Percent	Ratio[2]	p-value[3]
Non-Hispanic white	4,605,835	602,380	13.1	1.00	--
POC[1]	1,931,798	383,522	19.9	1.52	<0.0001
Black	1,373,994	277,199	20.2	1.54	<0.0001
Hispanic	510,971	92,679	18.1	1.38	<0.0001
American Indian	142,493	40,621	28.5	2.18	<0.0001
Total[1]	6,537,633	985,902	15.1		

[1]People of color can be counted in more than one racial/ethnic category. The total population is equal to the number of non-Hispanic Whites plus the number of POC.
[2]Ratio of the percent of people of other racial/ethnic groups to percent of non-Hispanic Whites living within 3 miles of an IHO
[3]A difference in proportions of this magnitude or greater would be expected to occur less than one time in ten thousand if people of different racial/ethnic groups had been randomized to live within 3 miles of an IHO.

Table 4
Ratios comparing the percent of people residing within 3 miles of an IHO in blocks with POC compared to blocks with no POC

Percent POC	Population	Unadjusted Prevalence Ratio	95% CI	Adjusted[1] Prevalence Ratio	95% CI
0	694,747	1.0	referent	1.00	referent
>0 to <20	2,577,015	0.83	0.82, 0.83	1.01	1.00,1.02
20 to <40	1,364,923	1.34	1.33, 1.45	1.95	1.93, 1.97
40 to <60	799,124	1.35	1.34, 1.36	2.15	2.13, 2.16
60 to <80	526,305	1.64	1.62, 1.65	2.53	2.50, 2.55
80 to 100	575,519	2.14	2.12, 2.16	3.30	3.27, 3.32

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density

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Table 5
Ratios comparing the percent of people residing within 3 miles of an IHO in blocks with Black residents compared to blocks with no Black residents

Percent Black	Population	Unadjusted Prevalence Ratio	95% CI	Adjusted[1] Prevalence Ratio	95% CI
0	1,308,061	1.00	referent	1.00	referent
>0 to <20	2,941,746	0.93	0.92, 0.94	1.20	1.19,1.21
20 to <40	1,043,277	1.44	1.43, 1.45	2.07	2.05, 2.08
40 to <60	536,198	1.52	1.51, 1.53	2.18	2.17, 2.20
60 to <80	336,232	1.57	1.56, 1.59	2.19	2.17, 2.21
80 to 100	372,119	2.01	1.99, 2.02	3.06	3.04, 3.09

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density

Table 6
Percent difference in the percent of people residing within 3 miles of an IHO for a ten percent increase in the population of each racial/ethnic group

Racial/ethnic group	Unadjusted Percent	95% CI	Adjusted[1] Percent	95% CI
POC	10.7	10.6, 10.8	14.8	14.7, 14.9
Black	9.4	9.3, 9.4	13.0	12.9, 13.1
Hispanic	8.5	8.4, 8.6	16.3	16.1, 16.4
American Indian	16.2	16.0, 16.4	11.8	11.6, 12.0

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density

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Table 7
Difference in SSLW of hogs within 3 miles of residents of blocks with POC compared to blocks with no POC

Percent POC	Unadjusted SSLW[2]	95% CI	Adjusted[1] SSLW	95% CI
0	Referent	-	Referent	-
>0 to <20	-35	-73, 3	190	154, 227
20 to <40	177	136, 219	535	495, 575
40 to <60	308	262, 353	717	672, 762
60 to <80	510	459, 561	896	846, 946
80 to 100	453	403, 503	837	788, 885

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density
[2]1,000s of pounds

Table 8
Difference in SSLW of hogs within 3 miles of residents of blocks with Black residents compared to blocks with no Black residents

Percent Black	Unadjusted SSLW[2]	95% CI	Adjusted[1] SSLW	95% CI
0	Referent	-	Referent	-
>0 to <20	-4	-33, 25	237	207, 265
20 to <40	190	153, 227	493	457, 530
40 to <60	327	281, 372	620	576, 665
60 to <80	275	221, 330	547	494, 599
80 to 100	165	113, 218	494	444, 545

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density
[2]1,000s of pounds

Table 9
Difference in SSLW of hogs within 3 miles of residents of blocks for a ten percent increase in population of each racial group

Racial/ethnic group	Unadjusted SSLW[2]	95% CI	Adjusted[1] SSLW	95% CI
POC	67	63, 71	100	96, 104
Black	38	34, 42	64	60, 68
Hispanic	183	174, 192	242	234, 251
American Indian	124	111, 137	92	80, 105

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density
[2]1,000s of pound

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ATTACHMENT 12

Industrial Hog Operations in North Carolina Disproportionately Impact African-Americans, Hispanics and American Indians

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Revised: October 19, 2015

Summary

Background: In 2014, the North Carolina Department of Environment and Natural Resources (NC-DENR) issued a swine waste management general permit (the General Permit) covering more than 2,000 industrial hog operations (IHOs). These facilities house animals in confinement, store their feces and urine in open pits or cesspools, and apply the waste to surrounding fields. Air pollutants from the routine operation of confinement houses, cesspools, and waste sprayers affect nearby neighborhoods, causing disruption of activities of daily living, stress, anxiety, mucous membrane irritation, respiratory conditions, reduced lung function, and acute blood pressure elevation. Prior studies showed that this industry disproportionately impacts people of color in North Carolina.

Methods: We obtained records on the sizes and locations of permitted IHOs from NC-DENR and calculated the steady state live weight (SSLW) of hogs as an indicator of the amount of feces and urine produced at each IHO. We obtained block-level information on race and ethnicity from the 2010 census of the United States. We compared the proportions of people of color (POC), Blacks, Hispanics, and American Indians living within 3 miles of an IHO to the proportion of non-Hispanic Whites. We quantified relationships between race/ethnicity, presence of one or more IHOs, and the SSLW of IHOs, using Poisson regression and linear regression to adjust for rurality.

Results: Analyses based on a study area that excludes the State's five major cities and western counties that have no presence of this industry show that the proportion of POC living within 3 miles of an industrial hog operation is 1.46 times higher than the proportion of non-Hispanic Whites. The proportions of Blacks, Hispanics, and American Indians living within 3 miles of an industrial hog operation are 1.50, 1.41, and 2.22 times higher, respectively, than the proportion of non-Hispanic Whites ($p<0.0001$). In census blocks with 80 or more percent POC, the proportion of the population living within 3 miles of an industrial hog operation is 1.81 times higher than in blocks with no POC. This excess increases to 3.01 times higher with adjustment for rurality. Adjusted for rurality, the SSLW of hogs within 3 miles of a census block increases, on average, 74, 47, 165, and 72 thousand pounds for every 10 percent increase in POC, Black, Hispanic, and American Indian population ($p<0.0001$).

Conclusions: IHOs in North Carolina emit air and water pollutants that can be measured in nearby neighborhoods where they adversely impact the health and quality of life of residents. Census blocks near IHOs re-permitted in 2014 are disproportionately populated by Black, Hispanic, and American Indian residents, a spatial pattern recognized as environmental racism.

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Background

Swine production in North Carolina changed dramatically during the last decades of the 20th century. Between 1982 and 2006, the number of hog operations in the State declined precipitously while the hog population increased from approximately 2 to 10 million (Edwards and Driscoll 2009). Production became concentrated in eastern North Carolina (Furuseth 1997).

Traditional North Carolina producers raised small numbers of hogs, commonly fewer than 25, as one of several commercial crops on diversified farms (Edwards and Driscoll 2009). In contrast, industrial producers raise large numbers of hogs, often many thousands, in confinement houses that are designed to vent toxic gases and particles into the environment. Animal wastes are flushed into open cesspools and then sprayed on nearby fields. Pollutants emitted by IHOs include hydrogen sulfide, ammonia, a wide array of volatile organic compounds, and bioaerosols including endotoxins, bacteria, yeasts, molds, and other respiratory irritants (Cole et al. 2000) (Schiffman et al. 2001).

The negative impacts of particles and gases inside IHO confinements on worker health have been extensively described (Casey et al. 2015; Cole et al. 2000; Donham 1993; Donham et al. 1995; Donham 1990; Donham 2010). Environmental levels of IHO pollutants are lower than inside confinements, however, workers in physically demanding jobs tend to be less susceptible to pollutants than some members of exposed communities, which includes children, people with allergies, asthma, or other respiratory or cardiovascular conditions. An extensive body of peer-reviewed scientific evidence shows that IHOs release contaminants into neighboring communities where they affect the health and quality of life of neighbors. Many of these studies have been conducted in North Carolina. Hydrogen sulfide concentrations within 1.5 miles of IHOs in North Carolina are associated with neighbors' ratings of hog odor and inability to engage in routine daily activities (Wing et al. 2008), increased stress and anxiety (Horton et al. 2009), irritation of the eyes, nose and throat, respiratory symptoms (Schinasi et al. 2011), and acute elevation of systolic blood pressure (Wing et al. 2013). A study of North Carolina public middle school children who participated in an asthma survey, which was conducted by the North Carolina Department of Health and Human Services, found that children attending schools within three miles of an IHO had more asthma-related symptoms, more doctor-diagnosed asthma, and more asthma-related medical visits than students who attended schools farther away (Mirabelli et al. 2006). The same study reported a 23% higher prevalence of wheezing symptoms among children who attended schools where staff reported noticing livestock odor inside school buildings twice or more per month compared to children who attended schools where no livestock odor was reported (Mirabelli et al. 2006). Other studies in North Carolina (Tajik et al. 2008) (Wing and Wolf 2000) (Bullers 2005) (Schiffman et al. 1995) and elsewhere (Donham et al. 2007) (Thu et al. 1997) (Radon et al. 2007) also document negative impacts of IHO air pollution on neighbors' health and quality of life.

Liquid contaminants from IHOs are released to the environment through leakage of animal waste storage pits, runoff from land application of liquid wastes, atmospheric deposition, and failure of the earthen walls of waste pits (Burkholder et al. 2007) (Wing et al. 2002). A recent study of DNA from swine-specific bacteria found increased prevalence of a genetic marker of pig bacteria in surface waters downstream from IHOs, and increased prevalence of the marker

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following precipitation that can transport fecal wastes from land application sites into surface waters (Heaney et al. 2015). Overflow of waste pits during heavy rain events results in massive spills of animal waste into neighboring communities and waterways. For example, in late September, 1999, 237 North Carolina IHOs were located in flooded areas identified from satellite imagery provided by the NC Division of Emergency Management (Wing et al. 2002). Parasites, bacteria, viruses, nitrates, and other components of liquid IHO waste pose threats to human health (Burkholder et al. 2007; Cole et al. 2000).

Routine use of sub-therapeutic doses of antibiotics to increase weight gain of hogs promotes antibiotic resistance, making infections in humans more difficult to treat (Silbergeld et al. 2008). Airborne bacteria, including antibiotic-resistant strains, have been isolated from IHO air emissions (Gibbs et al. 2006; Green et al. 2006; Schulz et al. 2012), and antibiotic-resistant bacteria are associated with animal vectors near industrial animal operations, including flies (Graham et al. 2009), rodents (van de Giessen et al. 2009), and migratory geese that land on North Carolina's IHO liquid waste pits (Cole et al. 2005). A recent medical records study from Pennsylvania shows that people living near IHO liquid waste application sites have elevated rates of infection with methicillin-resistant *Staphylococcus aureus* (Casey et al. 2013). North Carolina industrial livestock workers carry strains of *Staphylococcus aureus* that are associated with swine, including antibiotic-resistant strains (Rinsky et al. 2013). These bacteria could be spread by liquid waste and airborne particles.

Because of the well-documented ability of IHOs to degrade the environment and health of nearby communities, their disproportionate location in communities of color is an environmental justice issue. In an earlier study based on information from the United States Census of 1990 and locations of IHOs in 1998 reported by the NC-DENR, our research group showed that the State's IHOs were disproportionately located in areas where more POC, primarily African Americans, live (Wing et al. 2000). We concluded that their disproportionate location in communities of color represented an environmental injustice. Since 1998, additional IHOs have obtained permission to operate and others are no longer in business. Additionally, between 1990 and 2010 the State's population size and spatial distribution changed due to births, deaths, and migration. In this report, we update our previous findings (including an earlier version of this report filed with the US-EPA in September, 2014) by evaluating whether IHOs covered under the General Permit issued on March 7, 2014, disproportionately impact POC, Blacks, Hispanics, and American Indians.

Materials and Methods

On January 5, 2015, we downloaded a list of all industrial livestock operations from the NC-DENR website. From that list we excluded all non-swine operations and facilities that operate under individual permits or National Pollutant Discharge Elimination System general permits and facilities with certificates of coverage that expired prior to October 1, 2014. Following the protocol provided in our previous study, which we also followed in the 2014 Report, we excluded facilities operated by research institutions because they are subject to different location and management decisions than commercial operations (Wing et al. 2000). For facilities holding multiple permits, for example wean-to-feeder and feeder-to-finish, we combined counts for different stages of growth to obtain a total head count for each operation. To estimate the

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potential pollution source from IHOs with different size animals (boars, farrow-to-wean, wean-to-feeder and feeder-to-finish), we calculated each facility's total steady state live weight (SSLW) of hogs based on the number and average weight of each growth stage of swine permitted at the facility. We corrected latitude and longitude for IHOs with geographic coordinates outside the county in which they were listed using the protocol developed for our previous study (Wing et al. 2000).

The vulnerability of people of any race/ethnicity to having polluting facilities nearby can be affected by the race and ethnicity of other people in their community. For example, African-Americans who live in areas primarily populated by non-Hispanic Whites may have, generally, a lower susceptibility to being near polluting facilities than African-Americans who live in areas primarily populated by Hispanics or American Indians. We therefore conducted our primary analyses of disproportionate impact using the POC category. We also conducted analyses for specific racial/ethnic categories. We defined the following racial/ethnic categories: non-Hispanic White (non-Hispanics who identified as White and no other race), POC (all people not categorized as non-Hispanic white), Black (people who identified themselves as African-American or Black with or without any other race), Hispanic of any race, and American Indian (people who identified themselves as American Indian with or without any other race). We used block-level race/ethnicity-specific population counts from the US Census of 2010.

As large-scale agricultural facilities, IHOs are not located in major cities. Following the protocol adopted in our prior research, we defined a study area for our primary analyses that excluded census blocks in the five major metropolitan areas of North Carolina (Charlotte, Winston Salem, Greensboro, Durham, and Raleigh) as well as 20 western counties that neither have an IHO nor border a county that has an IHO. We conducted additional analyses for the entire State.

We considered people to be within the potential impact zone of IHOs if they lived in census blocks whose block centroids were within three miles of an IHO re-permitted in 2014. Blocks were categorized as either having, or not having, an IHO within three miles. Additionally, we considered the total permitted SSLW of hogs within three miles of the centroid of each block as a measure of the total potential influence of pollutants from nearby IHOs on the residents.

As in our prior study, we also calculated the population density of each block, defined as the number of people per square mile. Population density is a measure of rurality, which is strongly related to the availability of land for agriculture and the price of land. Racial/ethnic groups in North Carolina differ in their urban versus rural residence, making them differentially susceptible to types of polluting facilities that locate in rural versus urban locations. For example, a larger proportion of non-Hispanic Whites in North Carolina live in remote rural areas than do Blacks, therefore the susceptibility of Whites versus Blacks to IHOs is affected by their differential residence in more rural versus more urban areas. By adjusting for population density (rurality), we compare racial vulnerability to IHOs for racial groups within each level of rurality. This adjustment is analogous to other statistical adjustments in epidemiology, as when the death rates of two countries are compared: even though death rates at every age may be higher in a poor than a rich country, the poor country may have a lower overall death rate because it has a younger age distribution. In that case, age-adjustment is used to compare mortality in the two

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countries just as we use density-adjustment to compare the proximity to IHOs in areas with different racial/ethnic make-up.

We used weighted Poisson regression to quantify relationships between race/ethnicity and the presence of one or more IHOs within three miles of a block and weighted linear regression to quantify relationships between race/ethnicity and the SSLW of hogs permitted within three miles of a block. We used census block populations as weights. In density-adjusted models, we included variables for the natural log of population density raised to the first, second, and third power. As in our prior analysis (Wing et al. 2000), this cubic model fit the data well and additional power terms added little to the model fit. For the two largest racial/ethnic groups other than non-Hispanic Whites, POC, and Blacks, we categorized race/ethnicity in groups of blocks 20% in width compared to blocks with no POC using indicator variables. Due to smaller numbers in these categories, we did not fit models with indicator variables for Hispanics and American Indians. We also considered the percent of people of each race/ethnicity as a continuous variable, estimating the added burden of IHOs for a 10% increase in the population.

This study involves neither random sampling nor randomization of exposure to IHOs, therefore statistical significance testing is inappropriate and confidence intervals do not correspond to the probability that the true values of measures of association are within the interval. However, the US-EPA considers statistical significance in its assessment of environmental racism. We therefore report p-values for differences in proportions of each racial/ethnic group within 3 miles of an IHO using t-tests. We report 95% confidence intervals (CIs) as measures of precision of the associations estimated from regression models. 95% CIs that exclude the null value (1.0 for ratios and 0.0 for differences) are commonly considered to be statistically significant at $p<0.05$.

Results

Based on criteria enumerated above, 2,029 IHOs housing 1.29 billion pounds of swine are covered under the General Permit issued in March, 2014 (Table 1). The 155 (7.6%) IHOs permitted to house between 20 and 100 thousand pounds accounted for only 1% of the total permitted SSLW. The 343 (16.9%) IHOs permitted to house between 1 and 10.3 million pounds accounted for 46.7% of the total (Table 1).

Figure 1 shows counties included in the study area, counties and cities excluded from the study area, and the locations of IHOs covered under the General Permit issued in 2014 by NC-DENR. Figure 2 shows the proportion of POC in 2010 census blocks included in the study area and the total population in each of six categories.

There are over 6.5 million residents of the study area (Table 2). Approximately 961 thousand (14.8%) of these residents live in census blocks whose centroid is within 3 miles of an IHO covered under the 2014 General Permit. This includes 563,228 non-Hispanic Whites and 397,661 POC. 12.9% of non-Hispanic Whites and 18.7% of POC in the study area live in blocks within 3 miles of an IHO.

Based on the study area population in Table 2, Table 3 shows ratios of the percentages of POC living within 3 miles of an IHO compared to the percentages of non-Hispanic Whites living

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within 3 miles of an IHO. The percentage of POC living within 3 miles of an IHO is 1.46 times higher than the percentage of non-Hispanic Whites. The percentages of Blacks, Hispanics, and American Indians living within 3 miles of an IHO are 1.50, 1.41 and 2.22 times higher, respectively, than non-Hispanic Whites. If residents of the study area had been randomized to live within 3 miles of an IHO, the probabilities of observing differences of these magnitudes or greater would be less than 0.0001; the observed differences are considered to be highly statistically significant.

We calculated these same ratios based on the entire State population of 9,535,483. The percentages of POC, Blacks, Hispanics, and American Indians living within 3 miles of an IHO are 1.38, 1.40, 1.26 and 2.39 times higher than the percentage of non-Hispanic Whites, respectively. These ratios are considered to be highly statistically significant.

Figure 3 shows the percent of people living within 3 miles of an IHO in relation to the percent of POC in blocks. The percent of people within 3 miles of an IHO is lowest in blocks with >0 to 20% POC (9.8%) and highest in blocks with >80% POC (23.9%).

Table 4 presents ratios of the percent of people living within 3 miles of an IHO in blocks with POC in the ranges of >0 to <20%, 20 to <40%, 40 to <60%, 60 to <80% and 80 to 100% compared to blocks with no POC. The population of these categories ranges from a low of 559,179 in blocks with no POC to a high of 2,383,810 in blocks with >0 to <20% POC. Ratios on the right side of Table 4 are adjusted for rurality. These ratios are significantly elevated in all categories with more than 20% POC. The highest ratio, indicating that 3.01 times as many residents live near IHOs compared to blocks with no POC, occurs for blocks with more than 80% POC.

Table 5 shows results of the same analyses for Blacks. They also show that the percent of people living within 3 miles of an IHO is statistically significantly elevated in all groups of blocks that are more than 20% Black, with or without adjustment for rurality. With adjustment for rurality, areas that are 80% or more Black, 2.74 times as many people live within 3 miles of an IHO compared to areas with no Blacks.

Table 6 shows the average increase in the population living within 3 miles of an IHO for a 10 percent increase in the population of POC, Blacks, Hispanics, and American Indians. This analysis is similar to the results in Tables 4 and 5, but rather than using categories, the relationship between race/ethnicity and proximity to IHOs is modeled as a linear function. For every ten percent increase in POC, the proportion of people residing within 3 miles of an IHO increases, on average, by 9.7%. These values are 8.6, 9.3, and 16.7 for Blacks, Hispanics, and American Indians, respectively. Adjusting for rurality, 14.5% more people reside within 3 miles of an IHO for each additional ten percent POC. Adjusted values are 12.3, 17.3 and 12.0 for Blacks, Hispanics, and American Indians, respectively. These linear relationships between race/ethnicity and living near IHOs are considered to be highly statistically significant.

Table 7 shows the difference in SSLW of hogs within 3 miles of residents of blocks with POC in the ranges of >0 to <20%, 20 to <40%, 40 to <60%, 60 to <80% and 80 to 100% POC compared to blocks with no POC. Blocks in categories with more than 20% POC have, on average,

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between 58,000 and 341,000 pounds more hogs within 3 miles than blocks with no POC. Adjusting for population density, blocks with more than 60 percent POC have, on average, more than half a million pounds more hogs permitted within 3 miles than areas with no POC. These excesses are considered to be highly statistically significant.

Table 8 presents parallel results for percentage Black population. As for POC, areas with more than 20% Black residents have an excess SSLW of hogs compared to areas with no Black residents, and differences are greater with adjustment for rurality. Adjusted for population density, blocks with more than 40% Black residents have approximately 350,000 more pounds of hogs within 3 miles than areas with no Black residents. These excesses are considered to be highly statistically significant.

Table 9 provides the average additional SSLW of hogs permitted in areas with POC for each percent increase in specific racial/ethnic categories. Adjusted for population density, the permitted SSLW of hogs within 3 miles of blocks increases 74, 47, 165, and 72 thousand pounds for each ten percent increase in POC, Black, Hispanic, and American Indian population, respectively. These linear relationships between race/ethnicity and SSLW are considered to be highly statistically significant.

As shown in Figure 1, IHOs are concentrated in North Carolina's Coastal Plain Region, between the Piedmont and Tidewater. Figure 2 shows that this region has more people of color than other parts of the study area. The racial and ethnic disparities reported above would be larger if the counties of western North Carolina, which, with the exception of Cherokee County, have low proportions of POC, were included in the analysis.

Conclusion

IHOs operating under the NC-DENR General Permit in 2014 are disproportionately located near communities of color. These disparities are considered to be highly statistically significant for Blacks, Hispanics, American Indians, and all POC. IHOs pollute local ground and surface water. They routinely emit air pollutants that negatively impact the quality of life and health of nearby residents. In addition to their well-documented effects on physical, mental, and social well-being, residents of areas with a high density of IHOs, and especially residents of color, have been subjected to intimidation including threats of legal action, violence, and job loss (Wing 2002). The industry's close ties with local and state government officials help it to avoid regulation that could protect neighbors, and create barriers to democracy in rural communities of color (Thu 2001, 2003). These discriminatory impacts could be reduced by decreasing the density of production and use of technologies that prevent releases of pollutants.

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Figure 1
North Carolina Counties Included in the Study Area, Counties and Cities Excluded from the Study Area, and Locations of IHOs operating under the 2014 General Permit

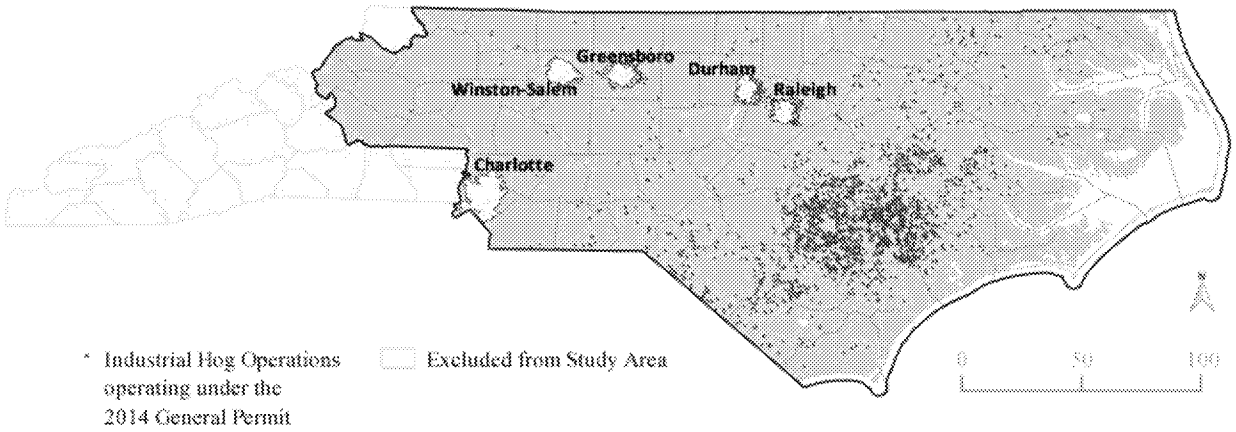

Figure 2
Percentage of People of Color in North Carolina Census Blocks, 2010

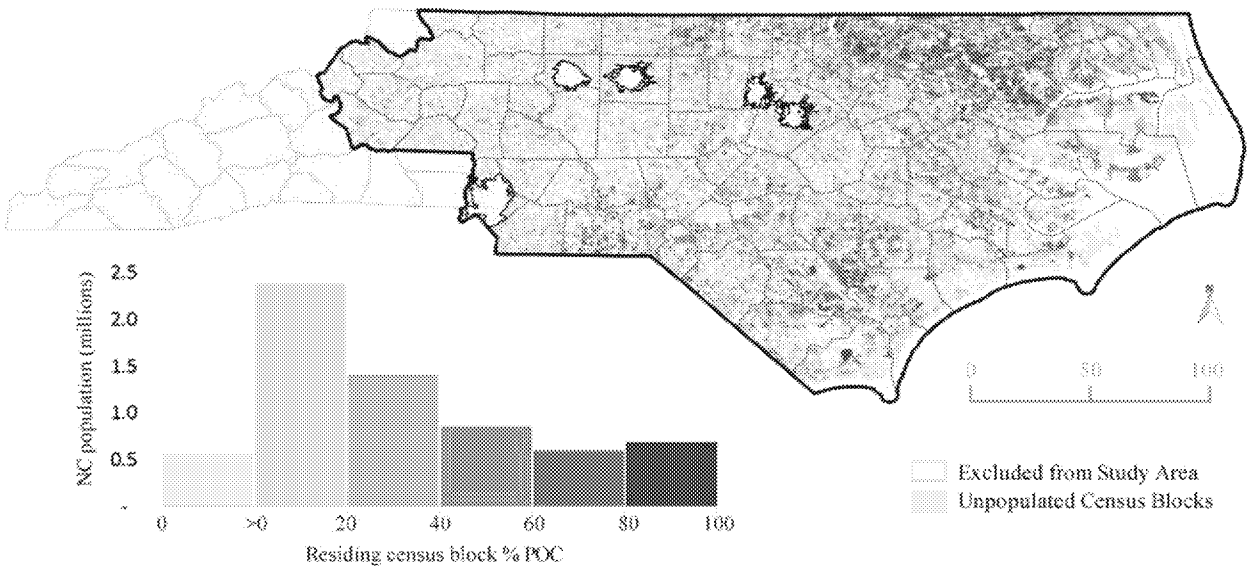

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Figure 3
Percent of Population Living Within 3 miles of an IHO Covered under the North Carolina General Permit, 2014 in Relation to Percent People of Color

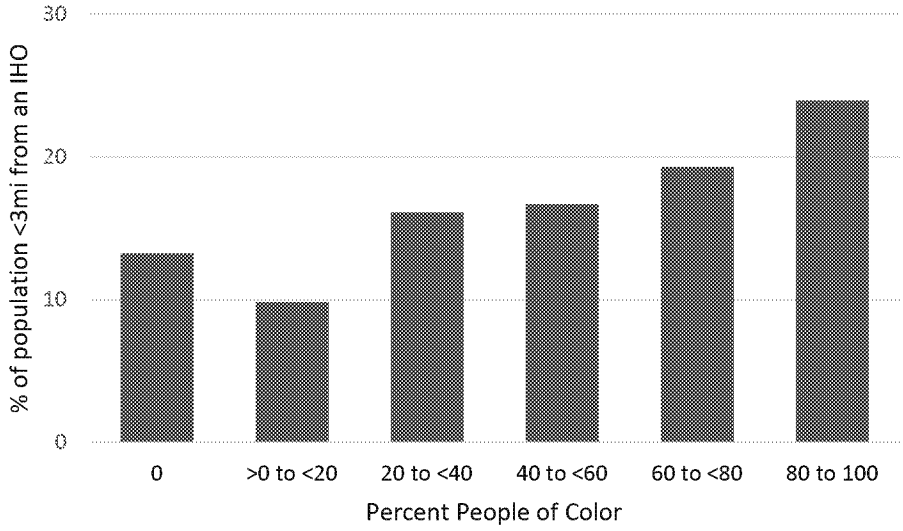

Table 1
Steady State Live Weight of IHOs Operating under the General Permit, NC, 2014

Permitted SSLW[1]	Number of IHOs	Percent of IHOs	Total SSLW[1]	Percent of total SSLW
21-	155	7.6	12,226	0.9
100-	439	21.6	75,135	5.8
250-	570	28.1	219,812	17.1
500-	522	25.7	379,414	29.4
1,000-10,260	343	16.9	601,988	46.7
Total	2,029	100.0	1,288,575	100.0

[1]Thousands of pounds

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Table 2
Racial/Ethnic Composition of NC Census Blocks Less than and More than 3 Miles of an IHO Operating Under the 2014 General Permit

	≤3 miles from an IHO		>3 miles from an IHO		
Racial Category	Number	Percent	Number	Percent	Total[1]
Non-Hispanic white	563,228	12.9	3,817,835	87.1	4,381,063
POC	397,661	18.7	1,724,393	81.3	2,122,054
Black	264,272	19.3	1,105,923	80.7	1,370,195
Hispanic	92,204	18.1	416,938	81.9	509,142
American Indian	40,578	28.5	101,599	71.5	142,177
Total[1]	960,889	14.8	5,542,228	85.2	6,503,117

[1]POC can be counted in more than one racial/ethnic category. The total population is equal to the number of non-Hispanic Whites plus the number of POC.

Table 3
Ratios of POC Compared to Non-Hispanic Whites Living within 3 Miles of an IHO Operating under the 2014 General Permit

Racial/ethnic		≤3 miles from an IHO			
Category	Population	Number	Percent	Ratio[2]	p-value[3]
Non-Hispanic white	4,381,063	563,228	12.9	1.00	--
POC*	2,122,054	397,661	18.7	1.46	<0.0001
Black	1,370,195	264,272	19.3	1.50	<0.0001
Hispanic	509,142	92,204	18.1	1.41	<0.0001
American Indian	142,177	40,578	28.5	2.22	<0.0001
Total	6,503,117	960,889	14.8		

[1]People of color can be counted in more than one racial/ethnic category. The total population is equal to the number of non-Hispanic Whites plus the number of POC.
[2]Ratio of the percent of people of other racial/ethnic groups to percent of non-Hispanic Whites living within 3 miles of an IHO
[3]A difference in proportions of this magnitude or greater would be expected to occur less than one time in ten thousand if people of different racial/ethnic groups had been randomized to live within 3 miles of an IHO.

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Table 4
Ratios Comparing the Percent of People Residing within 3 Miles of an IHO in Blocks with POC Compared to Blocks without POC

Percent POC	Population	Unadjusted Prevalence Ratio	95% CI	Adjusted[1] Prevalence Ratio	95% CI
0	559,179	1.00		1.00	
>0 to <20	2,383,810	0.75	0.74, 0.75	0.91	0.90, 0.92
20 to <40	1,410,751	1.22	1.21, 1.23	1.79	1.77, 1.80
40 to <60	858,568	1.26	1.25, 1.28	2.04	2.03, 2.06
60 to <80	597,258	1.46	1.45, 1.47	2.38	2.35, 2.40
80 to 100	693,551	1.81	1.80, 1.83	3.01	2.99, 3.04

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density

Table 5
Ratios Comparing the Percent of People Residing within 3 miles of an IHO in Blocks with Blacks Compared to Blocks without Blacks

Percent Black	Population	Unadjusted Prevalence Ratio	95% CI	Adjusted[1] Prevalence Ratio	95% CI
0	1,288,564	1.00		1.00	
>0 to <20	2,931,777	0.92	0.91, 0.92	1.18	1.17, 1.19
20 to <40	1,043,183	1.43	1.42, 1.44	2.05	2.04, 2.07
40 to <60	534,792	1.51	1.50, 1.53	2.18	2.16, 2.19
60 to <80	333,780	1.55	1.54, 1.56	2.15	2.13, 2.17
80 to 100	371,021	1.79	1.77, 1.80	2.74	2.71, 2.76

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density

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Table 6
Average Percent Difference in the Percent of People Residing within 3 miles of an IHO for a Ten Percent Increase in Each Racial/Ethnic Group

Racial Group	Unadjusted Percent	95% CI	Adjusted[1] Percent	95% CI
POC	9.7	(9.6, 9.8)	14.5	(14.5, 14.6)
Black	8.6	(8.5, 8.6)	12.3	(12.2, 12.3)
Hispanic	9.3	(9.2, 9.5)	17.3	(17.2, 17.5)
American Indian	16.7	(16.5, 16.8)	12.0	(11.9, 12.2)

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density

Table 7
Average Difference in SSLW of hogs within 3 miles of residents of blocks with POC compared to blocks without POC

Percent POC	Unadjusted SSLW[2]	95% CI	Adjusted[1] SSLW[2]	95% CI
0	0	-	0	-
>0 to <20	-82	-110, -54	55	27, 82
20 to <40	58	28, 88	287	257, 316
40 to <60	123	90, 156	395	363, 427
60 to <80	284	249, 320	560	525, 595
80 to 100	341	307, 375	625	591, 658

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density

[2]1,000s of pound

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Table 8
Average Difference in SSLW of Hogs within 3 Miles of Blocks with Blacks Compared to Blocks without Blacks

Percent POC	Unadjusted SSLW[2]	95% CI	Adjusted[1] SSLW[2]	95% CI
0	0	-	0	-
>0 to <20	-46	-66, -26	96	76, 116
20 to <40	96	71, 121	283	259, 308
40 to <60	195	164, 227	379	349, 410
60 to <80	186	149, 223	356	319, 392
80 to 100	141	105, 176	348	313, 383

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density
[2]1,000s of pounds

Table 9
Average Difference in SSLW of Hogs within 3 Miles of Residents of Blocks for a Ten Percent Increase in Each Racial/Ethnic Group

Racial/Ethnic Group	Unadjusted SSLW2	95% CI	Adjusted1 SSLW2	95% CI
POC	48	46, 51	74	71, 76
Black	30	27, 33	47	44, 50
Hispanic	127	121, 133	165	159, 171
Am. Indian	94	85, 102	72	64, 81

[1]Adjusted for rurality using a cubic polynomial of the natural log of population density
[2]1,000s of pound

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ATTACHMENT 11

DECLARATION OF STEVE WING

I, Steve Wing, do hereby declare as follows:

1. My full name is Steven Bennett Wing. I am of legal age and competent to give this declaration. All of the information herein is based on my own personal knowledge unless otherwise indicated.

2. From 1985 to present I have been a faculty member in the Department of Epidemiology at The University of North Carolina at Chapel Hill. I am currently an Associate Professor. A copy of my Curriculum Vitae is attached as **Exhibit 1**.

3. Since 1996 my research has focused on the impact of swine confinement facilities, also known as confined animal feeding operations ("CAFOs") or industrial hog operations ("IHOs"), and on the well-being and quality of life of neighboring residents and workers.[1-22] I reviewed much of this research in a recent book chapter.[23]

4. Before industrialization of the hog industry, most North Carolina producers raised small numbers of hogs, commonly fewer than 25, on diversified farms where hogs were one of several commercial crops, or products.[24] Swine production in North Carolina changed dramatically during the last decades of the 20th century. Between 1982 and 2006 the number of hog operations in the state declined precipitously while the hog population increased from approximately 2 to 10 million (see Wing, 2014,[23] Figure 3.3). Industrial producers in North Carolina adopted a system of raising large numbers of hogs, often many thousands, in confinement structures that exhaust toxic gases and particles into the environment. While smaller, pasture-based hog farms were spread across the state, industrial facilities became spatially concentrated in North Carolina's eastern coastal plain.[25] This low-lying region, which

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has sandy soils and shallow aquifers and is vulnerable to flooding, now has the top 10 ranked counties for numbers of hogs per land area in the entire United States.[26]

5. A large hog CAFO produces as much waste as a city of 50,000 or more people, but unlike cities, has no wastewater treatment plant. Instead, animal wastes are flushed into open cesspools and then sprayed on nearby fields (see Wing, 2014,[23] Figure 3.1). Industrial-scale animal waste sprayers capable of dispersing hundreds of gallons of waste per minute create mists that can easily drift downwind into neighboring communities (see Wing, 2014,[23] Figure 3.2). Hog CAFOs emit gases and particles from confinements, open cesspools, sprayfields, and bins of rotting carcasses that are stored on site prior to disposal.

6. Airborne emissions from hog CAFOs have demonstrated impacts on the health and quality of life of neighbors.[2,23,27,28]

7. Air pollution from hog CAFOs harms human health. Particles less than 10 microns in aerodynamic diameter (PM_{10}), including endotoxins, bacteria, yeasts and molds that are recognized toxins and inflammatory mediators,[29] can be inhaled deep into the respiratory tract. Hog CAFO gases can affect both the upper and lower respiratory tract. Hydrogen sulfide, a toxic compound produced by anaerobic decomposition of hog waste, travels off-site through the air to nearby communities, and is a useful marker of complex mixtures of gases and particles emitted by hog CAFOs.[30] Ammonia, which can irritate the eyes and mucous membranes, is also released by hog CAFOs. Humans absorb gaseous ammonia in the upper respiratory tract. When transformed into fine particles in the presence of humidity, ammonia can reach deeper into the lungs.[1,31]

8. Hog CAFOs emit a large number of volatile organic compounds that contribute to the offensive odors described by neighbors. These compounds may occur as gases or may be

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adsorbed to fine particles. When fine particles are inhaled and settle onto the warm, moist mucous membranes of the nose, they release odorant compounds that are detected by the olfactory nerves.[1,31] Airborne emissions from hog CAFOs have pronounced impacts on the health and quality of life of neighbors.

9. The negative impacts of particles and gases inside swine confinements on worker health are well-documented.[1,32-39] A 2010 review notes that respiratory effects include "symptoms of acute and chronic bronchitis, nonallergic occupational asthma, mucous membrane irritation, and organic dust toxic syndrome."[29] These effects have been observed repeatedly in research in different countries with different study designs despite the healthy worker effect, a well-known phenomenon in occupational epidemiology. The healthy worker effect refers to the observation that workers tend to be healthier than the general population, which includes people too sick to work and people who are sensitive to hazards in the workplace.[40] Confinement workers are exposed to higher concentrations of particles, gases and microbes than are CAFO neighbors, however, communities near CAFOs include children, the elderly, people who are too sensitive to CAFO dusts and gases to work there, and people with chronic respiratory disease. Furthermore, nearby communities are exposed involuntarily to hog CAFO pollutants in and around their homes, where they have expectations to beneficial use of their property and freedom from substances that cause physical discomfort, annoyance, stress and anxiety.

10. An extensive body of peer-reviewed scientific evidence shows that hog CAFOs contaminate the air in neighboring communities where they affect the health and quality of life of neighbors.[2,32,41-50] There are some differences in the way North Carolina hog CAFOs operate compared to CAFOs in other areas. For example, in Iowa, hog waste is usually stored in pits under the confinements, whereas in North Carolina hog waste is typically stored in open-air

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ponds known to the industry as "lagoons." Although studies of community impacts of hog CAFOs in other parts of the U.S.A. and Europe are relevant to the situation in North Carolina, in the following paragraphs I focus on studies conducted in North Carolina by our research group, including university faculty members, doctoral student research assistants, university research staff, members of community-based organizations, and government scientists.

11. With support from the North Carolina Department of Health and Human Services and the National Institute of Environmental Health Sciences, our research group conducted a survey of health and quality of life of residents of three eastern North Carolina communities with similar demographic and economic characteristics.[21] In one community, residents lived within two miles of a hog CAFO. One of the comparison areas had two cattle operations, and the other had no industrial livestock facilities. Residents living near the hog CAFO reported higher frequencies of headache, runny nose, sore throat, coughing, diarrhea, and burning eyes compared to residents of the community with no industrial livestock production. To evaluate quality of life we asked participants how often in the past six months they were unable to open their windows or go outside even in nice weather. Hog CAFO neighbors reported an average of 18.5 days in the past six months when they couldn't open their windows, and 15.4 days when they couldn't go outside, compared to 3.2 and 2.1 days, respectively in the community with no livestock production.[21] Our research was published in *Environmental Health Perspectives*, the peer-reviewed scientific journal of the National Institute of Environmental Health Sciences, National Institutes of Health, United States Department of Health and Human Services.

12. During the 1999-2000 school year, the North Carolina Department of Health and Human Services conducted a survey of respiratory symptoms, asthma diagnoses and asthma treatment among public middle school students across the State. Because this survey did not

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include an evaluation of environmental exposures that could affect children's respiratory heath, we sent a questionnaire to rural school staff to assess environmental exposures including the frequency of occurrence of livestock odors at the schools. Because respiratory irritants and allergens are present in air emissions from hog and poultry CAFOs, we hypothesized that asthma symptoms would be more prevalent among children who attended schools affected by livestock air pollution. We found that children who attended schools where staff reported noticing livestock odor inside school buildings twice or more per month had a 23% higher prevalence of wheezing symptoms compared to children who attended schools where no livestock odor was reported. Children attending schools within three miles of a hog CAFO had more asthma-related symptoms, more doctor-diagnosed asthma, and more asthma-related medical visits compared to students who attended schools further away.[6] *Pediatrics*, the peer-reviewed journal of the American Academy of Pediatrics, published our findings.

13. In 2009 our research group monitored hydrogen sulfide on the grounds of three public middle schools in eastern North Carolina and evaluated relationships between detection and concentration of hydrogen sulfide and upwind hog CAFOs.[22] We used active monitors to record concentrations continuously over one to two months at each school. From aerial imagery we quantified the areas of hog confinement buildings within 5 km (approximately 3 miles) of each school. We linked hourly hydrogen sulfide concentrations at the schools with hourly wind direction measurements from airports near the schools. The areas of upwind hog confinements were weighted by 1/distance^2 to account for the attenuation of pollutants with increased distance of CAFOs from the schools. The log odds of detecting hydrogen sulfide increased, on average, 0.43±0.06 (about a 50% increase) for every 1,000 m^2 increase in upwind distance-weighted barn area.[22] Each school in this study had approximately 60,000 m^2 of swine barns within 5 km.[22]

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This study shows that hydrogen sulfide, a toxic gas produced by hog CAFOs, can be measured at nearby schools, and the frequency of detection is higher when the wind is blowing from hog CAFOs towards the schools. Based on a more sensitive instrument that was available for one school, hydrogen sulfide was detected over half of the hours during two months of monitoring.[22] This study shows that hydrogen sulfide concentrations are related to hog CAFOs within 5 km of monitoring locations. Hydrogen sulfide is a marker of many gases and particles emitted by hog CAFOs. The schools in this study, which predominantly serve students of color, are exposed to hog CAFO pollutants that could disrupt educational experiences and affect children's physical, mental and social development.[22] Our paper has been accepted for publication in the *Journal of Exposure Analysis and Environmental Epidemiology*, published by Nature Publishing Group.

14. From 2003 until 2005 our research group conducted a repeated-measures study of air pollution, health and quality of life in 16 neighborhoods in eastern North Carolina. The neighborhoods, in three different counties, were located within 1.5 miles of between one and 16 hog CAFOs. For two to three weeks, we monitored concentrations of PM_{10} and hydrogen sulfide at a central location in each neighborhood (see Wing, 2014,[23] Figure 3.10). While we monitored air pollution, adult non-smokers living around the monitors participated in a study of health and quality of life. Participants had their odor sensitivity tested and chose times each morning and evening when they agreed to sit on their porch for 10 minutes to be exposed to the ambient air. For two to three weeks, twice a day, they used a structured diary to rate the strength of hog odor from none to very strong, rate their experience of irritation of the eyes, nose and respiratory symptoms, report disruption of routine activities of daily living, measure their lung function, and measure their blood pressure (see Wing, 2014,[23] Figure 3.9). One hundred and one study participants produced over 2,900 journal entries. This study was designed to evaluate the acute

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effects of hog CAFO air pollution on neighbors. Rather than comparing exposed communities to unexposed communities in another location, we compared participants' symptoms, quality of life, lung function and blood pressure at times when they were exposed and times when they were unexposed. Thus, each person served as her or his own control. Unlike comparisons between exposed and unexposed communities which can be affected by differences between groups in medical history, diet, weight, occupational exposure, housing and other attributes, these other potential influences on health are essentially the same for a person for the two to three weeks of the study when they experienced time periods of higher vs. lower hog CAFO pollution. This design allowed us to determine whether exposures preceded the outcomes of interest and ensured that health differences between exposed and unexposed time periods were not due to typical so-called "confounding factors." The disadvantage of this design is that people were not in the study long enough to be able to examine the chronic effects of long-term exposures.[18]

15. Study participants reported hog odor outside their homes on more than half of days in the study and inside their homes on 12.5% of days.[30] Reported hog odor and measured hydrogen sulfide concentrations were highest in the mornings and evenings – times when people commonly like to engage in outdoor activities at home (see Wing, 2014,[23] Figure 3.11).[30] Participant reports of hog odor were strongly related to ambient concentrations of hydrogen sulfide, and to levels of fine particles at higher wind speeds (particles travel further in the wind than when the air is still).[30] The correspondence between participants' hog odor ratings and pollutant concentrations measured by air monitors provides objective validation of participants' odor ratings. Indeed, the relationship between odor and hydrogen sulfide in our study

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corresponds closely to results of a chamber experiment in which participants were exposed to CAFO air.[49]

16. During the two-to-three weeks of the study, approximately one-third of participants reported cancelling or changing daily activities due to hog odor. As we explained in our paper published by *Environmental Health Perspectives*, "[t]ypical changes included closing windows, avoiding sitting in the yard and socializing with friends, cancelling plans to barbecue, not putting clothes out to dry, declining exercise via outdoor walks, not putting up Christmas lights, not being able to garden or mow the lawn, not washing the car, or not being able to sit on the porch."[30] Participants reported cancelling or changing their daily activities 11.3 times more often when average odor in the past 12 hours was rated as 5 or greater on the 0-8 scale compared to times when average odor was less than 1. Hog CAFO odors were highly disruptive of daily activities in this population despite the fact that three-quarters of participants indicated they grew up on a farm where they had experience with livestock odors.[30]

17. There is considerable evidence documenting the impact of malodor on annoyance.[4] In the case of odors from hog CAFOs, a broad range of mood impacts has been of interest. Authors of the first published study of impacts of hog CAFO odor on North Carolina residents concluded that, "[p]ersons living near the intensive swine operations who experienced the odors reported significantly more tension, more depression, more anger, less vigor, more fatigue, and more confusion than control subjects."[48]

18. As part of the repeated-measures study described in paragraph 14 above, our research group evaluated hog odor and measured pollutants as triggers of stress and negative mood.[4] Participants reported feeling more stressed or annoyed, nervous or anxious, gloomy or unhappy, angry or grouchy, and confused or unable to concentrate, during times when hog odors

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were stronger. Participants also reported higher levels of stress and annoyance during times when air pollution monitoring instruments showed that concentrations of hydrogen sulfide and semi-volatile PM_{10} were higher in their neighborhoods.[4] The *American Journal of Public Health*, the peer-reviewed scientific journal of the American Public Health Association, published these findings.

19. Odorant chemicals have physiological as well as psychological effects in humans. Most people have experienced salivation in response to the pleasant smell of good food. Malodor also has physiological effects. Participants in the study described in paragraph 14 above measured their blood pressure after sitting outdoors for 10 minutes. To limit the possibility of errors in recording blood pressure values, each participant printed their blood pressure readings with a time stamp and pasted the print-outs in their diaries. Participants' diastolic blood pressures were higher at times when they reported stronger hog odor outside their homes than when there was less odor (see Wing, 2014,[23] Figure 3.12). Their systolic blood pressures rose with the concentrations of hydrogen sulfide, measured in a central location in their neighborhoods at the time they sat outside.[19] In addition to providing an objective measure of people's physiological response to odorant compounds that cause annoyance, physical symptoms, and disruption of daily activities, repeated acute elevations of blood pressure are a medical concern due to their potential to contribute to chronic hypertension.[19] The peer-reviewed scientific journal *Environmental Health Perspectives* published these findings.

20. Consistent with well-documented effects of ammonia, PM_{10}, and volatile organic compounds, as well as prior reports of human impacts of air pollution from hog CAFOs, participants in the repeated-measures study described in paragraph 14 experienced physical as well as mental discomfort in the presence of hog CAFO air pollution. After sitting outside for 10

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minutes at their selected morning and evening times, participants reported more irritation of the eyes, nose, throat, skin and more coughing when hog odor was stronger compared to when it was weaker or absent.[9] Eye irritation was related to concentrations of hydrogen sulfide and PM_{10}. One or more respiratory symptoms were related to hydrogen sulfide, components of PM_{10}, endotoxin, and odor. A measure of lung function, forced expiratory volume in one second, which participants took following their ten-minute outdoor exposure, declined with increasing average concentrations of fine particles ($PM_{2.5}$) in the past 12 hours.[9] These physical effects of exposure to airborne emissions from hog CAFOs help explain the stress, annoyance, and inconveniences experienced by hog CAFO neighbors. *Epidemiology*, the peer-reviewed journal of the International Society for Environmental Epidemiology, published these findings.

21. Research based on qualitative interviews can help elucidate the influence of social factors in environmental health research.[51] Our research team therefore designed a study using in-depth interviews. After completing the repeated-measures study described in paragraph 14, 42 participants and seven other volunteers from the same neighborhoods participated in semi-structured interviews designed to obtain information about how odor from the hog CAFOs in their neighborhoods affected their enjoyment of life and beneficial use of property. The interviews were recorded and transcribed, and codes were assigned to participants' responses.[12]

22. Our study found that hog CAFO odor impacts neighbors' ability to engage in activities they enjoy the most and that they expect to be able to do inside and outside their homes. These include "cookouts, barbequing, family reunions, socializing with neighbors, gardening, working outside, playing, drying laundry outside, opening doors and windows for fresh air and to conserve energy, use of well water, and growing vegetables." We concluded that "[t]he types of activities that are restricted by hog odor are social interactions, physical activities,

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energy- and cost-saving activities, relaxing outside or indoors, and sleeping." We further noted that restriction of these activities is important because they "have been shown to positively affect health, improve overall well-being, reduce stress, and strengthen social networks."[12] The peer-reviewed journal, *New Solutions: A Journal of Environmental and Occupational Health Policy*, published our findings.

23. Liquid contaminants from hog CAFOs are released to the environment through leakage from animal waste pits, runoff from land application of liquid wastes, atmospheric deposition (e.g. through rainfall), and failure of the earthen walls of waste pits.[52] Parasites, bacteria, viruses, nitrates, and other components of liquid hog CAFO waste pose threats to human health.[1]

24. In 2010 we conducted a study of fecal contamination of streams in an area of eastern North Carolina with a high density of hog CAFOs.[3] In many samples we found elevated levels of fecal indicator bacteria that are routinely used for public health protection. However, the presence of these organisms does not indicate whether the fecal contamination comes from livestock, wild animals, domestic pets, or humans. To determine whether fecal contamination of these streams could be traced to nearby hog CAFOs, we evaluated several candidate microbial source tracking markers. Microbial source tracking markers use DNA from microorganisms that have become adapted to the gastrointestinal tracts of particular species of animals, making them useful for identifying the type of animal that is responsible for fecal contamination. We found that two candidate markers, fecal *Bacteroidales* Pig-1-Bac and Pig-2-Bac, were present in 80% and 87%, respectively, of hog waste and wallow water samples, but were absent in chicken, turkey, goat, horse, cow, and human fecal samples. We found Pig-1-Bac and Pig-2-Bac to be more prevalent in samples taken downstream compared to upstream locations near hog CAFOs,

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and we found that their prevalence increased following rain events that can transport fecal waste from hog CAFO sprayfields into streams. This study provides direct evidence that hog CAFOs contaminate nearby streams during routine operations. *Science of the Total Environment*, an international peer-reviewed journal for scientific research into the environment and its relationship with humankind, published this research.

25. Routine air and water pollution from hog CAFOs can be contrasted with pollution that occurs following storms. Overflow of waste pits during heavy rain events results in massive spills of animal waste into neighboring communities and waterways (see Wing, 2014,[23] Figures 3.6 and 3.7). For example, our research group identified 237 hog CAFOs with permit coordinates that were located in flooded areas identified from satellite imagery taken approximately one week after Hurricane Floyd hit eastern North Carolina in September, 1999 (see Wing, 2014,[23] Figure 3.8).[16] These findings were published in *Environmental Health Perspectives*.

26. North Carolina state-issued operating permits require hog CAFOs to maintain adequate freeboard in their fecal waste pits to protect the pits from overflowing during times of heavy rains or increased production of waste. Freeboard is the space between the liquid waste and the top of the earthen containment wall. However, the permit requirement to maintain freeboard sometimes conflicts with the permit requirements that hog CAFOs apply waste at agronomic rates and that they refrain from land application during rain or when the ground is frozen and unable to absorb waste. Over-spraying of waste can contaminate ground and surface water near hog CAFOs. The North Carolina Department of Environment and Natural Resources has, in the past, temporarily waived prohibitions against non-agronomic land application to allow hog CAFOs to protect their freeboard. The Department does not have adequate personnel and

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other resources to surveil the thousands of sprayfields they have permitted, many of which are not visible from state roads, to evaluate how often non-agronomic land application occurs. Off-site dispersion of liquid wastes from fecal waste pits and sprayfields through routine leakage of waste pits, over-application, and storm events, threatens water quality of hog CAFO neighbors.

27. Extensive evidence shows that North Carolina hog CAFOs release toxic air and water pollution into surrounding neighborhoods where it directly impacts the health and well-being of neighbors. The affected communities are disproportionately composed of low-income people of color who have fewer protections from environmental hazards, less ability to leave their homes during high exposure periods, and less access to medical and clinical services than residents of higher income communities; these factors increase their vulnerability to the harmful impacts of hog CAFO emissions.[15,53] This evidence is consistent with evaluations of CAFO impacts in other locations[27] and understanding of the increased vulnerability of low income populations to environmental hazards.

[Signature page to follow]

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I declare under the penalty of perjury that the foregoing is true and correct.

EXECUTED this 28rd day of March, 2016 in Chapel Hill, North Carolina.

Steve Wing

CITATIONS

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EXHIBIT 1

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University of North Carolina Chapel Hill, NC	Ph.D. in Epidemiology 1983
Duke University Durham, NC	M.A. in Sociology 1980
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PROFESSIONAL EXPERIENCE

1995- Associate Professor, Department of Epidemiology, University of North Carolina, Chapel Hill.

1993 Visiting Professor, Department of Preventive Medicine, Federal University of Bahia, Salvador, Brazil.

1991-95 Assistant Professor, Department of Epidemiology, University of North Carolina, Chapel Hill.

1990 Visiting Professor, Faculty of Theoretical Medicine, University of Ulm, Germany.

1985-91 Research Assistant Professor, Department of Epidemiology, University of North Carolina.

1983-85 Post-doctoral Fellow, Department of Epidemiology, University of North Carolina, Chapel Hill.

FELLOWSHIPS AND HONORS

2014	John E. Larsh, Jr. Award for Mentorship, University of North Carolina School of Public Health
2014	Self-Determination Award, Black Workers for Justice
2011	Homer N. Calver Award, Environment Section, American Public Health Association
2009	International Society for Environmental Epidemiology Research Integrity Award
2004	Bernard G. Greenberg Alumni Endowment Award for Outstanding Teaching, Service and Practice, University of North Carolina School of Public Health
2003	Certificate of Honor, Alliance for Nuclear Accountability
1997	A Man Called Mathew Award, Concerned Citizens of Tillery and Land Loss Fund
1993	Brazilian National Research Council Visiting Professor Fellowship
1983-85	National Heart, Lung and Blood Institute Post-doctoral Traineeship
1983	Delta Omega, National Honorary Public Health Society
1981-83	National Heart, Lung and Blood Institute Pre-doctoral Traineeship
1980-81	United States Public Health Service Pre-doctoral Traineeship
1978-80	National Institute for General Medical Sciences Pre-doctoral Traineeship

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Wing S, Shy CM, Wood JL, Wolf S, Cragle D, Frome EL. Mortality of workers at the Oak Ridge National Laboratory, (letter in reply to letter by Gilbert and editorial by Prichard). *Health Physics* 62:261-264, 1992.

Wing S, Shy C. Public health effects of occupational and environmental radiation exposure (letter in reply to letters by Brown; Greenspan; and Marshall and Baker; and editorial by Hendee). *Journal of the American Medical Association* 266:653-4, 1991.

Monographs, non-refereed journal articles, and other published works

Wing S. When research turns to sludge. Academe 96(6):22-24, 2010.

Wing S. Raising animals and rising threats. Raleigh News & Observer, Raleigh, NC, June 24, 2009.

Wing S. Justica ambiental, ciencia y salud pública. *Salud y Medio Ambiente*, 37:35-45, 2009. (translation of 2005 article from *Essays on the Future of Environmental Health Research*)

Aitken M, Crump C, Heaney C, Lowman A, McDonald P, Wing S. Epidemiologic Surveillance and Investigation of Symptoms of Illness Reported By Neighbors of Biosolids Land Application Sites. Report to Water Environment Research Foundation, 2008.

Wing S, Warren C. Big money and public health. News & Observer, Raleigh, NC, March 7, 2008.

Wing S, Schinasi L. Public health preparedness: Social control or social justice? South Atlantic Quarterly, 106:789-804, 2007.

Grant G, Wing S. The North Carolina Hog Roundtable. Race, Poverty & the Environment, Winter, 2004, http://www.urbanhabitat.org/node/164.

Wing, S. Community-driven epidemiology and environmental justice: A course at The University of North Carolina. The Networker: Newsletter of the Science and Environmental Health Network 5(5), October, 2000, www.sehn.org.

Richardson D, Wing S, Stewart A. Epidemiologic Studies of the Effects of Exposure to Ionizing Radiation. Ministry of Finance and Energy, Schleswig-Holstein, Germany, 1997.

Wing S, Richardson D. Material Living Conditions and Health in the United States, Canada and Western Europe. Research in Public Health Technical Papers, Series 19, Pan American Health Organization, Washington, DC, 2000.

Wing S, Richardson D. Occupational Health Studies at Los Alamos National Laboratory. In, New Mexico's Right to Know: The Impacts of LANL Operations on Public Health and the Environment, Concerned Citizens for Nuclear Safety, 2002, http://www.nuclearactive.org.

Wing S. Evaluation of the US Agency for Toxic Substances and Disease Registry's Public Health Assessment of Laurence Livermore National Laboratory. Prepared for Tri-Valley CAREs, Western States Legal Foundation and the San Francisco Bay Area Physicians for Social Responsibility under their "Health Consultation on the Impact of Two Major Tritium Accidents at Livermore Lab: An Independent Scientific Analysis," 2002.

Invited scientific lectures, seminars and testimony

Health inequalities, industrial agriculture, and the Civil Rights Act of 1964. Joe G. Lopez Lectureship on Racial Disparities in Health, Boston University School of Public Health, October 29, 2014.

Reification of chance in epidemiology and society. Department of Public Health Sciences Medical University of South Carolina, March 21, 2014.

Epidemiologic studies of radiation releases from nuclear facilities. New York Academy of Medicine, March 11, 2013.

Poverty, health, and industrial hog production. Committee to Advance Science Writing, New Horizons in Science, Raleigh, NC October 28, 2012.

Social and ecological dimensions of the food supply: health inequalities. Exploring the True Costs of Food, Institute of Medicine, April 23-24, 2012

Environmental health and the corporate-government alliance. Homer N. Calver Award Lecture, Environment Section, American Public Health Association annual meeting, Washington, DC, October 31, 2011.

Cancer risks near nuclear facilities: The importance of research design and explicit study hypotheses. National Academy of Sciences Committee on Analysis of Cancer Risks Near Nuclear Facilities, Atlanta, GA, May 23, 2011.

Public health research and the environmental justice movement. Doris Slesinger Lecture, Department of Community and Environmental Sociology and Department of Family Medicine. University of Wisconsin, Madison, March 30, 2011.

Radiation health effects: The case of plutonium. Rocky Mountain Peace and Justice Center and Department of Environmental Studies, Naropa University, Boulder, CO, March 31, 2011.

Air pollution from swine CAFOs and health of neighboring communities. Departmental Seminar, Department of Environmental Health, Johns Hopkins University. December 8, 2010.

The scope of epidemiology. Expert workshop on cancer in Basrah, Iraq. Istanbul, November 17, 2010.

Swine CAFOs, air pollution, and community health. Evaluating the Health Effects to Local Communities of Confined Animal Feeding Operations (CAFOs) Workshop. NC State University, November 11, 2010.

Developing testable hypotheses for cancer risks near nuclear power facilities. Nuclear and Radiation Studies Board, National Academy of Sciences, Washington, DC, April 26, 2010.

What kind of action comes from research? (with Gary Grant). Partnerships for Environmental Public Health Program Meeting, Research Triangle Park, NC, April 26, 2010.

Research and Data Needs for Assessing and Addressing Disproportionate Environmental Health Impacts Among Minority and Disadvantaged Populations. (Panelist) US Environmental Protection Agency, Strengthening Environmental Justice and Decision Making: A Symposium on the Science of Disproportionate Environmental Health Impacts. Washington DC, March 17 - 19, 2010

Environment, disasters, and health disparities. Minority Health Conference, University of North Carolina, Chapel Hill, February 27, 2009.

Cancer around nuclear power plants: Collision of evidence and assumptions, déjà vu. Meeting of the Society for Radiation Protection, Virchow Clinic Campus, Medical University of Berlin, September 28, 2008.

Assumptions, evidence, and causal reasoning in radiation epidemiology. Annual meeting of the German Society for Epidemiology, Bielefeld, Germany, September 27, 2008.

Improving environmental health science through community-driven research. University of Texas Medical Branch Sealy Center for Environmental Health and Medicine, Galveston, TX, March 31, 2008 (with Gary Grant).

Integrating Epidemiology with Community Action for Environmental Justice. Department of Environmental Health Sciences, UNC Chapel Hill, March 19, 2008.

Whose science, whose environmental health? Fronteers in Environmental Science Series, National Institute of Environmental Health Sciences, Research Triangle Park, NC, September 14, 2007.

Changing views of the biological effects of low-level ionizing radiation. Royal Society of Medicine, London, International Physicians for Prevention of Nuclear War, October 3, 2007.

Research partnerships for public health and environmental justice. Jensen Lecture, Duke University Department of Sociology, April 7, 2006

Public health preparedness, disease control, and social justice. Rock Ethics Institute, Health as a Human Right Lecture, Pennsylvania State University, October 17, 2005.

Health disparities. American Medical Association – Medical Student Section Region 4 Annual Meeting, Duke University Medical Center, March 5, 2005.

Genes, justice, and racial inequalities in health. 5th Annual Minority Health Leadership Summit, School of Public Health, University of Pittsburgh, January 13, 2005.

Quantitative methods in the epidemiology of environmental injustice: Examples from eastern North Carolina. Math Departmental Seminar, East Carolina University, December 1, 2004.

Improving environmental health science through partnerships in communities affected by environmental injustice. The Science of Environmental Justice Working Conference, US Environmental Protection Agency, Boston University, May 25, 2004.

North Carolina swine production, health and environmental justice (with Gary R. Grant). The Science of Environmental Justice Working Conference, US Environmental Protection Agency, Boston University, May 26, 2004.

Environmental injustice in eastern North Carolina: Corporate hogs and guerrilla epidemiology. Department of Epidemiology and Biostatistics seminar, College of Public Health, University of South Florida, December 3, 2003.

Inequality and inequity: the broader causes of health disparities. Panel presentation, Mending the Health Care Divide: Eliminating Disparities in Access for Minority and Low Income Communities. University of North Carolina School of Law, UNC Center for Civil Rights and UNC School of Public Health, Chapel Hill, NC, November 1, 2003.

The "chilling effect" on environmental health research: Industry tactics and institutional disincentives. Conflicted Science: Corporate Influence on Scientific Research and Science-Based Policy, conference sponsored by the Center for Science in the Public Interest's Integrity in Science Project. July 11, 2003 Washington, DC.

Science, objectivity and ethics in environmental health. Dialogues for Improving Research Ethics in Envrionmental and Public Health (Conference), Brown University, Providence, RI, May 31, 2003.

Methodology and ethics in epidemiology of environmental justice: Industrial hogs and guerrilla epidemiology. Departmental Seminar, Department of Epidemiology, School of Public Health, State University of New York, Albany, NC, April 11, 2003.

Health disparities, research ethics and environmental epidemiology. Epidemiology Branch, National Institute of Environmental Health Sciences, May 13, 2002.

Health impacts, Risks and Response: Nuclear Terrorism in the Triangle, A Public Forum to Address Emergency Planning and Risk Minimization, sponsored by Orange and Chatham County Boards of Commissioners, William Friday Center, Chapel Hill, NC, May 2, 2002.

Bioterrorism preparedness and health disparities, The New War Economy, a teach-in sponsored by the UNC-CH Progressive Faculty Network, Chapel Hill, NC, April 19, 2002.

The role of epidemiology in evaluating releases from nuclear facilities: Insights from the work of Alice Stewart. The Alice Stewart Lecture, 16th Low Level Radiation and Health Conference, Dublin Institute of Technology, Ireland, June 21, 2002.

Health effects of low level radiation, Physicians for Social Responsibility, Los Angeles, March 11, 2002.

Community based environmental health research, Morehouse College and Southeast Community Research Center, Atlanta, GA, November 10, 2001.

Pork production, public health and environmental justice. Department of Environmental Health, University of Cincinnati, Departmental Seminar, May 23, 2001.

Subcommittee on Energy and Environment of the Committee on Science, United States House of Representatives, "Reexamining the Scientific Basis for the Linear No-Threshold Model of Low-dose Radiation," July 18, 2000. Published testimony: Serial No. 106-98, pages 101-115 and 123-138. Government Printing Office, Washington, DC: 2001.

Human Health, Sustainable Hog Farming Summit, New Bern, NC, January 11, 2001.

Integrating research, teaching and practice in environmental justice. Departmental Seminar, Department of Sociology and Anthropology, NC State University, December 1, 2000.

Community public health needs and industrial animal production research. American Public Health Association Annual Meeting, Boston, MA, November 14, 2000.

Social inequalities in occupational and environmental health. Brazilian Congress of Epidemiology Annual Meeting, Salvador, Bahia, Brazil, September 1, 2000.

The influence of age at exposure to radiation on cancer risk in humans. American Statistical Association Conference on Radiation and Health, Park City, UT, June 27, 2000.

National Academy of Sciences, Committee on the Biological Effects of Ionizing Radiation (BEIR VII). "The Relevance of Occupational Epidemiology to Radiation Protection Standards," Washington DC, June 13, 2000.

Radiation and Rocky Flats: Risks to workers and the public, Rocky Mountain Peace and Justice Center, Boulder, CO, June 24, 2000.

Public health and intensive hog production in North Carolina. Research Triangle Institute, June 9, 2000.

Low level radiation and health. Brookhaven National Laboratory, June 5, 2000.

Research to action: Getting our work used! Community-Based Research for Environmental Justice: Workshops from the Field 2000 Training and Conference, Rutgers University, Newark, NJ, May 21, 2000.

Health effects of nuclear weapons production, Our Nuclear Future, Conference held prior to the United Nations Disarmament Conference, United Nations Plaza Hotel, New York, NY, April 24, 2000.

US Environmental Protection Agency National Environmental Justice Advisory Committee, Enforcement Subcommittee, "Confined animal feeding operations," Atlanta, GA, May 25, 2000.

The challenge of environmental justice: Science, public health and advocacy, Minority Health Conference, School of Public Health, Chapel Hill, NC, February 18, 2000.

Environmental health effects of intensive livestock operations. Division of Occupational and Environmental Medicine departmental seminar, School of Medicine, Duke University, February 8, 2000.

United States Department of Agriculture Air Quality Task Force. "Health and intensive livestock operations," Research Triangle Park, NC, November 1, 1999.

Environmental injustice in North Carolina's hog industry. Regional Research Institute Colloquium, West Virginia University, Morganton, WV, October 8, 1999.

Community based research and environmental justice, African American Environmental Justice Action Network Conference, Arlington, VA, September 18, 1999.

Agriculture Committee, House of Representatives, North Carolina General Assembly, "Environmental Injustice in North Carolina's Hog Industry, " Raleigh, NC, April 27, 1999.

Intensive livestock operations, health, and quality of life among eastern North Carolina residents. Conference on Public Health Impacts of Intensive Livestock Operations, NC Department of Health and Human Services, Raleigh, NC, July 15, 1999.

Radiation and health, Hanford Downwinders Conference, Pendleton, WA, April, 1999.

Cancer and Three Mile Island, Three Mile Island Alert, Harrisburg, PA, March 26-27, 1999.

Environmental injustice in the North Carolina hog industry. Society of Toxicology Annual Meeting, New Orleans, LA, March 17, 1999.
Radiation and health, Livermore City Council, Lawrence Livermore National Laboratory, October 22-24, 1998.

Radiation and mortality among US Department of Energy workers: Relevance to radiation protection standards. NY Academy of Medicine, New York, September 26, 1998.

Health effects of Department of Energy Facilities. Physicians for Social Responsibility Annual Meeting, Arlington, VA, May 1, 1998.

Committee on Veterans Affairs, United States Senate, 105th Congress Second Session, "Ionizing Radiation, Veterans Health Care, and Related Issues," Washington, DC, April 21, 1998; published testimony: Serial HRG. 105-983, pages 14-16 and 111-113, U.S. Government Printing Office, Washington, DC.

Environmental justice in North Carolina, East Carolina University Brody School of Medicine, Greenville, NC, April 17, 1998.

Radiation epidemiology, Hanford Health Effects Subcommittee (CDC-ATSDR), Seattle, WA, 1997.

How communities affect epidemiology: A re-analysis of cancer incidence near Three Mile Island. Community Partnership Research Conference, Clark University, September 21, 1996.

How pure is the quantitative basis of epidemiology? An examination of four numerical concepts. London School of Hygiene and Tropical Medicine, July 1996.

Whose epidemiology, whose health? Department of Public Health, University of Liverpool, July 1996.

Department of Health and Human Services Advisory Committee on Energy-Related Epidemiologic Research, "Data collection and record access in epidemiological studies of workers at DOE facilities," Santa Fe, NM, April 18, 1996.

Occupational inequalities in mortality. Division of Occupational and Environmental Medicine, School of Medicine, Duke University, February 2, 1996.

Environmental epidemiology, Conference on Cancer and the Environment: Women's Action for Prevention, Shaw University, Raleigh, NC July 7, 1995.

An epidemiological triangle: Questions, answers and methods. Joint meeting of the Brazilian, Ibero-American and Latin American Congresses of Epidemiology, Salvador, Bahia, Brazil, April 24-28, 1995.

Radiation risks and mammography, Health and Today's Environment: A Symposium on Action for Cancer Prevention and Natural Health, Albuquerque, NM, October, 1994
Low-level radiation panel, Radiation Health Effects and Hanford: A Conference for Concerned Citizens and Health Care Providers, Spokane, WA, September, 1994

Health risks from ionizing radiation, Massachusetts Low-Level Radioactive Waste Management Board, Worcester, MA, November 3, 1993

Concepts in modern epidemiology: Population, risk, dose response and confounding. Workshop on Critical Theory in Epidemiology, Department of Preventive Medicine, Federal University of Bahia, Salvador, Brazil, June 14-18, 1993.

Recording of external radiation exposures at Oak Ridge National Laboratory: Implications for epidemiological studies. Workshop on the Epidemiologic Use of Nondetectable Values in Radiation Exposure Measurements. National Institute of Occupational Safety and Health, Cincinnati, OH, September 9 and 10, 1993.

Towards a post-Columbian science of disease causation. Indigenous Peoples Forum/Medical and Scientific Methods for Diagnosing Human and Environmental Effects from Nuclear Testing, Las Vegas, Nevada, October 2-4, 1992.

Subcommittee on Compensation, Pension and Insurance of the Committee on Veteran's Affairs, House of Representatives, 102nd Congress Second Session, "H.R. 3236 and H.R. 4458, Bills Affecting Veterans Exposed to Ionizing Radiation in Military Service," May 27, 1992. Published testimony: Serial No 102-42, pages 10-16 and 51-52, US Government Printing Office, Washington: 1992.

Recent findings on low-dose radiation and mortality at the Oak Ridge National Laboratory, U.S.A. Institute for Radiation Hygiene, Munich, Germany, March 5, 1992.

Recent findings on low-dose radiation and mortality at the Oak Ridge National Laboratory, U.S.A. German Cancer Institute, Heidelberg, Germany, March 4, 1992.

Recent findings on low-dose radiation and mortality at the Oak Ridge National Laboratory, U.S.A. Institute for Radiation Biology, University of Munster, Munster, Germany, March 3, 1992

Study of worker exposure at Oak Ridge National Laboratory. Low Level Radioactive Waste Forum Quarterly Meeting, New Orleans, LA, April 19, 1991.

Health effects of low level radiation, Chatham County, NC Low-Level Radioactive Waste Site Designation Review Committee, April, 1991

Health effects of low level radiation, Richmond County, NC Low-Level Radioactive Waste Site Designation Review Committee, April, 1991

Factors associated with the onset and magnitude of the decline of cardiovascular disease mortality in the United States. First International Searle Symposium on Prevention and Epidemiology, Ulm, Germany, July 5, 1990.

An epidemiological study of low dose occupational exposure to ionizing radiation. First International Searle Symposium on Prevention and Epidemiology, Ulm, Germany, July 5, 1990.

Social inequalities and health: The contradictory role of health professionals. 17th Annual Regional Conference on Maternal and Child Health, Family Planning, and Services for Children with Special Health Needs, Raleigh, N.C., May 2, 1990.

TEACHING

UNC Courses

2011-15 Lead instructor, Perspectives in Epidemiology and Public Health (EPID 890) (5 – 12 students per semester, fall and spring semesters)
A seminar for first-year MSPH students in the Department of Epidemiology.

2010 Lead instructor, Environmental Epidemiology (EPID 785) (14 students).

Introduction to topics and methods in environmental epidemiogogy.

2000- Lead instructor, Community-Driven Epidemiology and Environmental Justice (EPID 786) (7 – 15 students per semester)
Principles for conducting research within communities unduly burdened by environmental health threats. Topics include research ethics, community presentations, study design and implementation, and student research projects. EPID 278 was was selected as an innovative course by The Consortium for Environmental Education in Medicine in 2000, and was nominated by the Theta chapter of Delta Omega for the Delta Omega Award for Innovative Public Health Curriculum in 2001.

1997-99; 2007 Co-instructor, Occupational Epidemiology (EPID 276)

The course provides a background in the epidemiology of work-related illness and injury and the application of epidemiologic concepts and methods in protecting workers' health and safety.

1996- Lead instructor, History and Philosophy of Epidemiology (EPID 891) (12 – 28 students per semester)
This seminar exposes epidemiology doctoral students to issues and debates in the philosophy of science, the objects of knowledge in epidemiology, and the place of epidemiology in public health.

1994-97 Co-instructor, Advanced Methods in Epidemiology (EPID 268)
An in-depth treatment of key mehtodological topics in epidemiology, including concepts of cause, confounding, control selection, data quality, sampling variability, and effect modification.

1992-95 Instructor, Philosophy of Epidemiology (EPID 217)
A forum for evaluating the place of epidemiology in science, public health and society, focusing on the nature of objectivity and the social consturction of epidemiological knowledge.

1987-91 Instructor, co-instructor, Principles of Epidemiology (EPID 160)
An introductory course that considers the meaning, scope, and applications of epidemiology to public health practice and the uses of vital statistics data in the scientifi appraisal of community health.

1985-87 Co-instructor, Cardiovascular Disease Epidemiology (EPID 256)
Review of the main causes of cardiovascular disease morbidity and mortality, and their population determinants. Topics include epidemiologic methods, risk factors, strategies for prevention, and a student research project.

Other Courses

2011 Co-instructor, Cancer Epidemiology and Environmental Health Risk Assessment. University of Greifswald short course, Antalya, Turkey.

2007 Johns Hopkins University Fall Institute, Barcelona, Spain. Social Justice and the Environment (with Joan Benach).

1997 Co-instructor, Occupational and Environmental Epidemiology, Institute of Collective Health, Federal University of Bahia, Brazil. An introduction to epidemiology in occupational and environmental health.

1993 Lead instructor, Problems in Epidemiology: Methodology and Philosophy. Department of Preventive Medicine, Federal University of Bahia, Brazil.
An advanced seminar in philosophy of epidemiology conducted with faculty and students from UFBA.

1990 Co-instructor, Principles of Epidemiology, 4-week introductory graduate-level course. University of Ulm, Germany. An introductory course that considers the meaning, scope, and applications of epidemiology to public health practice and the uses of vital statistics data in the scientific appraisal of community health.

CONTRACTS & GRANTS

Submitted

Health and Air Pollution from Confined Animal Feeding Operations (principal investigator). National Institue of Environmental Health Sciences, R01, proposed 9/1/2014-8/31/2019.

Aromatic Amines and Bladder Cancer among Workers Exposed to Epoxy (co-investigator). National Institute for Occupational Safety and Health, R01.

Active

The impact of intensive livestock production on the disease ecology of antibiotic resistant staphylococcus (co-investigator). National Science Foundation, 2013-2016.

Air emissions from industrial animal operations and respiratory health of adolescents (principal investigator), Johns Hopkins University, 2009-2015.

Completed

2014 North Carolina Environmental Justice 2014 Summit Proposal (principal investigator), National Institue of Environmental Health Sciences, R13.

2013 Pathways for human uptake of emerging chemicals of concern in land-applied sewage sludge. Center for Environmental Health and Sustainability small grant (principal investigator), NIEHS.

2013 North Carolina Environmental Justice 2013 Summit Proposal (principal investigator), National Institue of Environmental Health Sciences, R13.

2009 Long-term Effects of Occupational Radiation Exposures (co-investigator), 2009-13.

2007 Community Health Effects of Sewage Sludge (principal investigator). National Institute of Environmental Health Sciences, 2007-2013.

2006 Epidemiologic Surveillance and Investigation of Symptoms of Illness Reported By Neighbors of Biosolids Land Application Sites (principal investigator), Water Environment Research Foundation, 7/1/2007-8/31/2008.

2003 Agricultural Dust and Childhood Asthma Symptoms (principal investigator, doctoral research of Maria Mirabelli), National Heart Lung and Blood Institute R01 HL073113, 04/01/03 – 03/31/05.

2002 Improving Environmental Health Research Through Dialogue (co-investigator). National Institute of Environmental Health Sciences, 9/30/02 - 8/31/07.

2002 Susceptibility in Occupational Radiation Risks (co-investigator). National Institute for Occupational Safety and Health, 9/30/02-9/29/05.

2002 Time-Factors in Exposure Effects Among Uranium Workers. (co-investigator). National Institute for Occupational Safety and Health, 5/01/02 - 4/30/05.

2002 Community-Driven Research on Environmental Justice and Landfills in North Carolina (principal investigator). Jesse Ball duPont Fund, 01/01/02 – 12/31/05.

2001 Community Health Effects of Industrial Hog Operations. (principal investigator). National Institute of Environmental Health Sciences, 09/01/01 - 08/30/08.

2000 Work and Health Disparities among Rural Women: Epidemiology Support (principal investigator). Duke University -- National Institute of Environmental Health Sciences, 09/30/00 - 09/29/05.

2000 Short Courses for Environmental Health Research Ethics: North Carolina Component (principal investigator). Syracuse University -- National Institute of Allergy and Infectious Disease, 09/30/00 - 08/31/06.

2000 Community Health and Environmental Reawakening (principal investigator). National Institute of Environmental Health Sciences, 09/01/00 - 04/30/09.

2000 Minority Graduate Research Assistant Supplement to Community Health and Environmental Reawakening (principal investigator). National Institute of Environmental Health Sciences, 09/01/00 - 08/30/01.

1999 Environmental and Public Health Impacts of Intensive Livestock Operations in the Wake of Flooding from Hurricane Floyd (principal investigator). Center for a Livable Future, Johns Hopkins School of Public Health, 01/01/00 - 12/30/00.

1998 Rural Health Study (principal investigator). North Carolina Department of Health and Human Services, 7/1/98 – 6/30/99.

1998 Older Women, Dietary Intake and Dependence on the Local Food Environment (principal investigator, doctoral research of Kimberly Morland, 07/01/98 – 06/30/99.

1997 Enabling Community-Based Environmental Research and Education (Principal Investigator). Chancellors Office, University of North Carolina at Chapel Hill, 12/01/97 - 6/30/98.

1997 Environmental Justice and Community-Based Prevention/Intervention Research Conference Grant, supplement to Southeast Halifax Environmental Reawakening (principal investigator). National Institute of Environmental Health Sciences, 09/01/97 - 08/31/99.

1996 Bahia-US Environmental Epidemiology Training and Research (co-investigator). Fogerty International Center, National Institutes of Health, 9/30/96 - 09/29/01.

1996 Ionizing Radiation and Mortality Among Hanford Workers (principal investigator). National Institute for Occupational Safety and Health, 09/30/96 - 09/29/01.

1996 Southeast Halifax Environmental Reawakening (principal investigator). National Institute of Environmental Health Sciences, 09/01/96 - 08/30/00.

1996 Critical Review of the United States Department of Energy Efforts to Investigate the Human Health Effects of Plutonium (principal investigator). Berger-Montague, 07/18/96 – 07/17/97.

1995 Time Related Factors in Radiation-Cancer Dose Response (principal investigator, Doctoral research of David Richardson). National Institute for Occupational Safety and Health, 07/01/95 - 06/30/97.

1994 Epidemiological Studies of the Accident at Three Mile Island (principal investigator). Center for Environmental Studies, John Snow Institute, 03/01/94 - 12/31/95.

1993 Study of Multiple Myeloma Among Workers Exposed to Ionizing Radiation and Other Physical and Chemical Agents (principal investigator). National Institute for Occupational Safety and Health, 10/01/93 - 02/29/96.

1992 Geographical Differentials in Stroke Mortality Levels and Trends in the U.S. (principal investigator). Centers for Disease Control, 08/28/92 - 03/30/93.

1992 The Potential Impact of Ill-Defined Mortality on the Decline of Ischemic Heart Disease in the U.S. (principal investigator, Doctoral research of Donna Armstrong). American Heart Association, North Carolina Affiliate, 07/01/92 - 06/30/93.

1990 Minority Graduate Research Assistant Supplement to Community Structure and Cardiovascular Mortality Trends (principal investigator). National Heart, Lung and Blood Institute, 07/01/90 through 05/31/92.

1989 Community Structure and Cardiovascular Mortality Trends (principal investigator). National Heart, Lung and Blood Institute, 06/01/89 - 05/31/93.

1987 Health and Mortality of Department of Energy Workers (co-investigator). U.S. Department of Energy, 10/01/87 - 03/31/94.

SERVICE

Department

Masters Examination Committee, Ad Hoc Core Course Review Committee, Masters Program Committee, Departmental Seminar Committee, Ad-hoc Task Group on Integration of the Core Methods Courses, Faculty Task Group on Course Evaluations, Curriculum Committee, Doctoral Qualifying Examination, Graduate Studies Committee, Awards Committee, MSPH Program Advisor

School

Greenburg Alumni Endowment Awards Committee, 2005
UNC Housekeeper Health Study Co-investigator, 1997-1999
Committee on Learning Environments and Research Networking for the 21st Century, 1995-1996
Institutional Review Board, 1994-1997
School of Public Health Awards Committee

University

Center for Health Promotion and Disease Prevention Population and Policy Working Group, 1998
University Faculty Council, 1993-1996
Buildings and Grounds Committee, 2009-2012

State

Member, Toluene Diisocyanate Advisory Panel, NC Division of Occupational and Environmental Epidemiology, 2007-2009.
Vice-President, NC Conference of the American Association of University Professors, 2007-2009.
North Carolina Central University, Advisory Board, Environmental Risk and Impact in Communities of Color and Economically Disadvantaged Communities, 2001-2002.
North Carolina Environmental Justice Network, member, annual NC Environmnetal Justice Summit Planning Committee, 1998 - present.
Center for Community Action, Lumberton, NC. Reviewer, health effects of tire pyrolysis facility, 1996.
Clean Water Fund of NC, Ashville, NC. Review of cancer studies in Paw Creek conducted by the NC Department of Health and Human Services, 1996.
Land Loss Fund, Tillery, NC, consultation on land loss and public health, National Black Land Loss Summit planning committee member, 1996.
UNC Alumni Heart Study (Duke University), research design consultation, 1985-88.

National

Institute of Medicine, Exploring the True Costs of Food: A Workshop, 2012
Agency for Toxic Substances and Disease Registry, peer reviewer, 2002.
Concerned Citizens for Nuclear Safety, Santa Fe, NM, 2000-2002.
California Environmental Protection Agency, member and Co-Chair, Santa Susanna Field Laboratory Advisory Panel, 2000-2002.
East Hampton Town Hodgkin's Cancer Task Force, East Hampton, NY. June 4-5, 2000.
US General Accounting Office, Denver, CO. Epidemiological evidence relevant to radiation protection, 2000.
West Virginia University, Morganton, WV. Social Environment and Rural Community Health Project, October 7-8, 1999.
National Academy of Sciences, Washington, DC. Reviewer, Review of the Hanford Thyroid Disease Study Draft Final Report, 1999.
Rural Coalition, Washington, DC. Presentation and consultation on community based evironmental health research, National Advisory Board, April 6, 1998.
Pan American Health Organization, Washington, DC. Review of literature on social inequalities in health (with David Richardson), 1998.
Ministry of Health and Environment, Schleswig-Holstein, Kiel, Germany. Review of literature on radiation health effects (with David Richardson and Alice Stewart), 1997-1998.
Clark University, Worcester, MA. Member of planning committee, Community Research Partnership Conference, 1996.
Yakama Indian Nation Environmental Restoration and Waste Management Program, Toppenish, WA. Consultation on radiation epidemiology, 1995.
Centers for Disease Control, Atlanta, GA. Reviewer of educational materials on health effects from the Hanford Plutonium prodcution facility, 1995.
American Public Health Association, Washington, DC. Member, Task Force on Social Welfare Policy, 1992-1993; co-author of Social Welfare Policy Statement.

Three Mile Island Public Health Fund Scientific Advisory Board, Philadelphia, PA. Consultation on radiation epidemiology, October, 1992.

Ministry of Health and Environment, Schleswig-Holstein, Kiel, Germany. Consultation with the Minsister of Health regarding radiation protection policy. March, 1992.

Northwest National Life Insurance Company State Health Rankings, Delphi Panel Member, 1992.

International

Scientific and Ethics Committee for the Clinical Study of the F1 Offspring of A-bomb Survivors

LEGAL RESEARCH AND TESTIMONY

United States District Court for the Southern District of West Virginia, OVEC et al. vs. FOLA Coal Company, LLC, 2015.

United States Environmental Protection Agency, Complaint Under Title VI of the Civil Rights Act of 1964, 42 U.S.C. § 2000d, 40 C.F.R. Part 7, 2014.

United States District Court for the Easter District of North Carolina, Multiple Plaintiffs vs. Murphy Brown, LLC, 2014.

United States District Court for the Western District of Pennsylvania, Alynda Talmadge, et al. vs. Babcock and Wilcox Power Generation Group, Inc., et al., 2014.

Wake County Superior Court, Waste Industries USA, Inc. and Black Bear Disposal, LLC vs. State of North Carolina and North Carolina Department of Environment & Natural Resources. 2010.

State of North Carolina Wake County Office of Administrative Hearings. Jerry Franks, Petitioner, vs. North Carolina Department of Environment & Natural Resources and Wake County Board of Commissioners, Respondents.

United States District Court for the District of Colorado, Merilyn Cook, et al. v. Rockwell International Company and the Dow Chemical Company, Civil Action No. 90cv00181JLK.

United States District Court for the Middle District of Pennsylvania. TMI Litigation Cases Consolidated II, Civil Action No. 1:CV-88-1452.

United States District Court for the Eastern District of Tennessee Northern Division at Knoxville. Euchee Marina & Campground, et al., Plaintiffs vs. Martin Marietta Energy Systems, Incorporated, et al., Civil Action No. 3-91-0510.

United States District Court for the Southern District of California. Glen and Doreth James, Plaintiffs, vs. Southern California Edison Company, et al., Case No. 94-1085 NJ (RBB).

District Court of Harris County, TX, 125th Judicial District. Terry Joe Groom, Plaintiff, vs. Schlumberger Technology Corporation et al., Case No. 94-42682.

United States District Court for the District of Colorado. Merilyn Cook, et al., Plaintiffs, vs. Rockwell International Corporation and The Dow Chemical Company, Civil Action No. 90-K-181.

Carolyn Mull, Personal Representative of the Estate of Roy Mull, Employee/Plaintiff vs. Duke Energy Corporation, Employer/Defendant, North Carolina Industrial Commission File No. 717904.

JOURNAL REVIEW

Accountability in Research: Policies and Quality Assurance
American Journal of Epidemiology
American Journal of Industrial Medicine
American Journal of Public Health
Annals of Epidemiology
CA - A Cancer Journal for Clinicians
Environmental Health
Environmental Health Perspectives
Environmental Research
Environmental Science: Processes and Impacts
Epidemiology
Epidemiology Research International
Health Education and Behavior
Journal of Epidemiology and Community Health
Journal of Exposure Science And Environmental Epidemiology
Journal of Gerontology
Medicine and Global Survival
New Solutions: A Journal of Environmental and Occupational Health Policy
Occupational and Environmental Medicine
Progress in Community Health Partnerships: Research, Education, and Action
Radiation Research
Science of the Total Environment
Social Movement Studies
Social Science and Medicine
New England Journal of Medicine
New Solutions

GRANT REVIEW

NIEHS special emphasis panel for Conference Grants (R13 Applications), April, 2014

NIEHS special emphasis panel, Environmental Justice: Partnerships for Communication, April, 2005.

NIEHS special emphasis panel, Environmental Health Sciences Center Grants, June, 2002.

NIEHS special emphasis panel, Community Based Prevention and Intervention Research, March 2000.

NIEHS special emphasis panel, Environmental Justice: Partnerships for Communication, February 1999.

NIEHS special emphasis panel, Community Based Prevention and Intervention Research, July 1996.

Alberta Cancer Board, 1992.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

EXTERNAL CIVIL RIGHT COMPLIANCE OFFICE
OFFICE OF GENERAL COUNSEL

January 12, 2017

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In Reply Refer to:
EPA File No. 11R-14-R4

William G. Ross, Jr.
Acting Secretary
North Carolina Department of Environmental Quality
1601 Mail Service Center
Raleigh, NC 27699-1611

Re: Letter of Concern

Dear Acting Secretary Ross:

We are writing to you to provide the North Carolina Department of Environmental Quality (NC DEQ) preliminary information related to the United States Environmental Protection Agency's (EPA) External Civil Rights Compliance Office's[1] (ECRCO) investigation into alleged discriminatory impacts from NC DEQ's operation of the Swine Waste Management System General Permit (Swine Waste General Permit). ECRCO has not concluded its investigation of EPA File No. 11R-14-R4 (Complaint) or reached final conclusions of fact or law. However, in light of the preliminary information gathered, ECRCO has deep concern about the possibility that African Americans, Latinos, and Native Americans have been subjected to discrimination as the result of NC DEQ's operation of the Swine Waste General Permit program, including the 2014 renewal of the Swine Waste General Permit.

EPA recognizes that there is new leadership at NC DEQ who were not involved in the events and correspondence described below relating to this Complaint and who will understandably need to come up to speed. ECRCO looks forward to sitting down with NC DEQ's new leadership in the next few weeks to provide any necessary background on NC DEQ's obligations under the federal nondiscrimination statutes and to discuss issues raised by ECRCO's investigation to date; any additional information NC DEQ may have relevant to the issues under investigation; the recommendations ECRCO has made below; and how to move forward on a constructive path to informally resolve the Complaint in the near future and ensure NC DEQ is in compliance with the applicable nondiscrimination statutes and regulations.

[1] Formerly the Office of Civil Rights. To eliminate confusion, except where quoting another document, this letter will use the Office's current name, rather than its name at the time of any particular action or correspondence.

Procedural Background of Complaint

On September 3, 2014, Earthjustice filed a complaint under Title VI of the Civil Rights Act of 1964, as amended, 42 U.S.C. §§ 2000d et seq., and the EPA's nondiscrimination regulations found at 40 C.F.R. Part 7, on behalf of the North Carolina Environmental Justice Network, Rural Empowerment Association for Community Help (REACH), and the Waterkeeper Alliance, Inc. alleging discrimination based on race and national origin by NC DEQ. The complaint alleged that NC DEQ's 2014 renewal of the Swine Waste General Permit without adequate measures to control, dispose of, and monitor animal waste from industrial swine feeding operations subjects African Americans, Latinos, and Native Americans to discriminatory impacts (*e.g.*, health issues, noxious odors, nuisances, increased expenses, social and psychological harms, declining property values).

On February 20, 2015, EPA opened an investigation into:

> Whether the North Carolina Department of Environmental Quality's (NC DEQ) regulation of swine feeding operations discriminates against African Americans, Latinos, and Native Americans on the basis of race and national origin in neighboring communities and violates Title VI of the Civil Rights Act of 1964 and the Environmental Protection Agency's implementing regulation.

On March 6, 2015, the Complainants and NC DEQ entered into an Alternative Dispute Resolution (ADR) process funded by EPA. ECRCO placed the investigation on hold pending the outcome of the ADR process. On March 7, 2016, the Complainants informed ECRCO that they were withdrawing from the ADR process.

On May 5, 2016, ECRCO informed NC DEQ that the ADR process between NC DEQ and the Complainants concluded without resolution; therefore, consistent with ECRCO procedures, ECRCO's investigation was reinitiated. On July 11, 2016, the Complainants filed an additional complaint alleging NC DEQ violated EPA's regulation prohibiting retaliation, intimidation, and harassment of Complainants (40 C.F.R. § 7.100). Among other events, Complainants point to events involving the Pork Councils' attempt to intervene at the January 2016 ADR session.

On August 1, 2016, NC DEQ submitted a response to the retaliation allegations. On August 2, 2016, ECRCO informed NC DEQ that it will also investigate:

> Whether NCDEQ's actions or inactions, including those associated with the presence and activities of the Pork Councils related to the January 2016 mediation session, violated 40 C.F.R § 7.100 which prohibits intimidating, threatening, coercing, or engaging in other discriminatory conduct against any individual or group because of actions taken and/or participation in an action to secure rights protected by the non-discrimination statutes OCR enforces.

On September 2, 2016, NC DEQ requested that ECRCO dismiss the original complaint. After reviewing the information provided by NC DEQ, ECRCO notified NC DEQ that the Complaint

would not be dismissed. On December 5, 2016, NC DEQ submitted a response to the Complaint.

ECRCO's investigation is being conducted under the authority of Title VI of the Civil Act of 1964, and EPA's nondiscrimination regulations (40 C.F.R. Part 7), and consistent with ECRCO's Interim Case Resolution Manual (https://www.epa.gov/ocr/case-resolution-manual) Title VI provides that "[n]o person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." 42 U.S.C. § 2000d. As implemented by EPA's regulation, these prohibitions include intentional discrimination as well as practices that have a discriminatory effect on the bases of race, color, or national origin. See 40 C.F.R. §§7.35(a), 7.35(b). The EPA regulation at §7.35 (b) prohibits a recipient from using criteria or methods of administering its program or activity which have the effect of subjecting individuals to discrimination. The EPA regulation also prohibits intimidation and retaliation against any individual or group for the purpose of interfering with a right protected by Title VI or because the individual has "filed a complaint, or has testified, assisted or participated in any way in an investigation, proceeding, or hearing" under EPA's regulation or has opposed any practice prohibited by the regulation. See 40 C.F.R. § 7.100.

ECRCO's investigation thus far has included an on-site visit to interview residents; reviewing information submitted by the Complainants including declarations prepared by residents and other witnesses; reviewing scientific and other literature and interviewing the authors when appropriate, and, a review of NC DEQ's responses to the Complaint dated August 1, 2016, September 2, 2016, and December 5, 2016. NC DEQ's December 5, 2016, letter requested that ECRCO "...provide any relevant information in its possession on the issue of discrimination by the State's regulation of Swine feeding operations." Below is a summary of information gathered thus far through ECRCO's investigation.

Adverse Impacts from Industrial Swine Operations on Communities of Color

On-Site Interviews and Declarations

ECRCO conducted an on-site visit to North Carolina (November 13-15, 2016) and interviewed over 60 residents living near industrial swine operations permitted under the Swine Waste General Permit. ECRCO's interviews were conducted mostly in Duplin and Sampson counties which have the highest concentration of industrial swine operations. To investigate the effects of the permitting program more broadly throughout the state, ECRCO also conducted interviews in other counties including Northampton County on the Virginia border and Pender County near the South Carolina border.

Some of the people interviewed had previously submitted declarations to ECRCO as exhibits to the Title VI complaint, some had not. The issues raised in the declarations and the impacts they discussed are similar or identical to those heard during the interviews. Many of those interviewed who had previously provided declarations provided updates to their declarations. ECRCO found credible all those interviewed thus far in the investigation. So far, ECRCO has heard in writing and/or orally from 85 witnesses in North Carolina who live near and described problems caused by their proximity to the industrial hog operations.

Residents, many of whom have lived in these communities for generations, described problems caused by their proximity to the industrial hog operations that have negatively changed their lives and communities, including those impacts described in studies referenced or discussed below. The residents described an overpowering stench, pests -- including a constant large number of flies, and the truck traffic all associated with the hog operations have forced residents to keep doors and windows closed and significantly limit any outdoor activity. Residents said the stench permeates homes, cars, and clothing. Some residents said the strength of the odor can be so strong it causes gagging, nausea and/or vomiting. For some residents who live near large numbers of industrial swine operations, they said stench is a weekly event lasting several days. They also stated they have no warning of when confinement house fans, spraying of the hog waste, or trucks transporting live or dead hogs will again bring the stench and actual waste onto their homes, property or themselves. Some described feeling as though they are prisoners in their own homes.

Residents described the loss of community that has occurred since the industrial hog farms began operating. They reported that young adults leave and do not return because of the odors, fear of health impacts from the air and drinking water, and other impacts. Prior to the arrival of the industrial hog operations, many of their family, community, and church gatherings had been held outdoors. Now they said those events are rarely held outdoors or if attempted outdoors, they are marred or forced to end early due to odors, flies, and other impacts.

Residents described increases in cases and severity of asthma and other respiratory illnesses, nausea, headaches and other health conditions. They stated these impacts have been compounded by the increase in industrial poultry operations, as well as the operation of landfills and waste disposal sites for hog sludge and carcasses. Those who had hunted and fished for both food and enjoyment, said they no longer do so because of the odors and fear of the contamination of wild sources of food such as fish. Residents stated they no longer keep gardens or grow their own vegetables for fear of contamination. Some residents are still on well water and are concerned about the safety of their drinking water. Some residents would prefer to use their private wells rather than public drinking water, but said they have either been told not to drink it or are afraid that it is contaminated. Residents also discussed increased expenses from buying and using public water, bottled water, clothes dryers, air fresheners, pesticides, air conditioning units, and food.

When asked whether they had filed complaints with NC DEQ or local governments about the odors, pests, and waste sprayed on them or their property, some residents said they did not know how or where to file complaints. ECRCO was told the filing of complaints with NC DEQ would be pointless and has resulted in retaliation, threats, intimidation, and harassment by swine facility operators and pork industry representatives. Several residents said that for more than 15 years, the government has been well aware of the conditions they have to live with, but has done nothing to help, so complaining to NC DEQ would be futile.

ECRCO also interviewed residents who live near an industrial swine operation that began operation using the lagoon and spray field method under a Certificate of Coverage under the Swine Waste General Permit. When discussing the impacts that occurred while the facility operated under the General Permit, the residents described the same impacts as those currently

living near facilities operating under the General Permit, including nausea; headaches; odors that permeated their homes and prevented them from enjoying their yards and the outdoors; concerns about impacts to groundwater and surface water; and increased numbers of flies and other pests.

After several years of operation, the operator installed innovative technologies and practices to reduce the odor and other impacts from his operation including covering the waste lagoons; not spraying in the evenings and on weekends; and not using dead boxes. When asked to describe the current impacts from that industrial swine operation, for the most part the residents who live nearby said they rarely notice intense odors and that the number of flies has been greatly reduced. The exception was that one bordering neighbor said that the smell was unbearable during spraying. Other neighbors pointed out that the smell could also be from other industrial swine operations near that resident's property that still employ open lagoons and spray fields. ECRCO and other EPA staff who toured the operation including the confinement houses and the edge of the lagoons were surprised at how little odor there was given the number of swine housed there at that time and the presence of more than one waste lagoon.

Other Information on Adverse Impacts of Industrial Swine Operations on Nearby Residents

EPA recognizes that industrial hog operations have a negative impact on nearby residents, particularly with respect to objectionable odors and other nuisance problems that can affect their quality of life. (EPA, *Animal Feeding Operations Consent Agreement and Final Order*, 70 FR 4957, 4959 (Jan. 31, 2005)). The adverse impacts of offensive odors from North Carolina's industrial hog operations have been a known issue for more than 20 years. In 1994, the North Carolina legislature established a Blue Ribbon Panel, the Swine Odors Task Force, to study "the problem of swine odors and how to reduce them."[2] The report of the Swine Odors Task Force stated protests had been "numerous and well publicized."[3]

In part to protect North Carolina's travel and tourism industry and allow time for the completion of the studies of odor and other problems associated with swine operations, the state legislature implemented a moratorium effective March 1, 1997, on the construction or expansion of swine operations[4] that use "an anaerobic lagoon as the primary method of treatment and land application of waste by means of a spray field as the primary method of waste disposal."[5] Any new or expanding swine operations were required to eliminate or reduce a number of impacts from the lagoon and spray field methods including substantially eliminating ammonia emissions and odors detectable beyond the boundaries of the swine operation.[6] The moratorium was made permanent in 2007. However, the industrial hog operations using the lagoon spray field configuration already operating at the time of the moratorium were allowed to continue to operate under the Swine Waste General Permit without the requirements to substantially eliminate ammonia emissions and odors. Today, in a handful of counties mostly in eastern North

[2] Dr. Johnny C. Wynne, et al., *Options for Managing Odor... a report from the Swine Odor Task Force (March 1, 1995)*, NORTH CAROLINA AGRICULTURAL RESEARCH SERVICE, N.C. STATE UNIV., *available at* http://www.mtcnet.net/~jdhogg/ozone/odor/swineodr.html#notsimple
[3] *Id.*
[4] S.L. 1997-458, H.B. 515, § 1.1(a).
[5] G.S. § 143-215.10I.
[6] G.S. § 143-215.10I (b)(2)-(3).

Carolina there is a total of more than 9 million hogs allowed in the more than 2000 industrial hog facilities operating under the Swine Waste General Permit.

North Carolina established a rule specifically to control objectionable odors from industrial swine operations.[7] "Objectionable odor" means any odor present in the ambient air that by itself, or in combination with other odors, is or may be harmful or injurious to human health or welfare, or may unreasonably interfere with the comfortable use and enjoyment of life or property. Odors are harmful or injurious to human health if they tend to lessen human food and water intake, interfere with sleep, upset appetite, produce irritation of the upper respiratory tract, or cause symptoms of nausea, or if their chemical or physical nature is, or may be, detrimental or dangerous to human health."[8] North Carolina's definition of "objectionable odor" encompasses the panoply of negative effects experienced by North Carolina residents, as told to ECRCO and discussed above.

Review of Reports and Studies

The adverse impacts on nearby residents from the lagoon spray field method of treatment and disposal of waste from industrial swine operations are documented in numerous peer reviewed scientific studies, including more than thirty conducted in North Carolina.[9] At ECRCO's request, EPA's Office of Research and Development (ORD) recently reviewed seven reports published by or with federal agencies.[10] ORD stated that the reports provide consistent support for the occurrence of potential health hazards (*e.g.*, eye, nose, and throat irritation; headaches; respiratory effects including asthma exacerbation; waterborne disease) at industrial swine operations and in their waste. Even while there is significant uncertainty regarding the levels of exposure in nearby communities to the identified contaminants and the risk of health effects attributable to those exposures, the risk for specific health effects in communities near industrial swine operations is a concern.

North Carolina's 1994 Swine Odors Task Force stated "it is not surprising to learn that living near a swine operation can affect mental health" when discussing a Duke University study of "the moods of people exposed to odors from commercial swine operations in North Carolina. Forty-four neighbors of hog operations . . . had less vigor and were significantly more tense, depressed, angry, fatigued, and confused."[11]

Additionally, ECRCO considered the findings of the analysis prepared by Drs. Steve Wing and Jill Johnston, *Industrial Hog Operations in North Carolina Disproportionately Impact African-Americans, Hispanics and American Indians*, (revised October 19, 2015) (*Complainants' Disproportionate Impact Analysis*). While the *Complainants' Disproportionate Impact Analysis* has not undergone peer review, it uses a study protocol and methodology that are substantially similar to peer reviewed studies by Wing et al. and Johnston et al.[12] The

[7] 15A NCAC 02D.1802(a).
[8] 15A NCAC 02D.1801(9).
[9] *See* Attachment A. Additional studies can be made available.
[10] *See* Attachment B.
[11] *See* Wynne, et al., *supra* note 3.
[12] *See* Steve Wing, et al., *Environmental Injustice in North Carolina's Hog Industry* (Mar. 2000), ENVIRONMENTAL HEALTH PERSPECTIVES, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1637958/; Jill E. Johnston, et al.,

Complainants' Disproportionate Impact Analysis concludes that the impacts from the manner in which waste is disposed of, and other impacts tied to industrial swine facilities operating under the Swine Waste General Permit, detrimentally affect those who live in neighboring properties and communities.

The *Complainants' Disproportionate Impact Analysis* also concluded, when examining those neighboring properties that African-Americans, Hispanics, and Native Americans are more likely than Whites to live near industrial swine operations granted COCs. Specifically, the *Complainants' Disproportionate Impact Analysis* concluded that, both state-wide, and in only-rural areas, African-Americans, Hispanics, and Native Americans living in North Carolina are more likely than Whites to live within 3 miles of an industrial swine operations granted COCs, and therefore suffer those detrimental effects. The *Complainants' Disproportionate Impact Analysis* looked at the steady state live weight (SSLW) of hogs within 3 miles of the center of census blocks. The SSLW was used as an indicator of density of hogs/the amount of swine feces and urine produced by the hogs in that 3-mile area. The *Complainants' Disproportionate Impact Analysis* found that for each 10 percent increase in the combined African-American, Hispanic, and Native American population and for each 10 percent increase in population for each of those census categories individually, the SSLW of hogs within 3 miles increases by anywhere from 47,000 to 165,000 pounds. This analysis concludes that there is a linear relationship between race/ethnicity and the SSLW or density of hogs.

Intimidation/Retaliation

The Complainants raised allegations of intimidation and harassment in their written submissions to ECRCO and during interviews related to the appearance of and actions by national and local representatives of the pork industry at what was to be a confidential ECRCO-sponsored alternative dispute resolution mediation session between NC DEQ and the Complainants. Complainants claim that, although NC DEQ representatives knew that complainants did not want representatives from the National Pork Producers Council and North Carolina Pork Council (Pork Councils) at this confidential meeting, NC DEQ representatives appeared to encourage their attendance and participation.

NC DEQ's responses in its letters dated August 1, 2016, and December 5, 2016, in part question whether complainants felt intimated by the Pork Council representatives' presence at the January 2016 mediation session. NC DEQ stated in both letters that "it strains credulity that these individuals were intimidated by the fact that they would be identified by representatives of organizations whom these individuals routinely criticized at public forums."[13] The following information provided to ECRCO may assist NC DEQ to better understand in part the context within which the Complainants have raised concerns about harassment, retaliation, and intimidation.

Wastewater Disposal Wells, Fracking, and Environmental Injustice in Southern Texas (Mar. 2016), AMERICAN JOURNAL OF PUBLIC HEALTH (2016), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4816143/.

[13] Letter to Lilian S. Dorka, Acting Director, EPA Office of Civil Rights from Sam M. Hayes, General Counsel, North Carolina Department of Environmental Quality (Dec. 5, 2016), at 8-9.

During interviews, residents including REACH members, and current and former Riverkeepers working in the eastern North Carolina rivers recounted first hand incidents of harassment, intimidation, and retaliatory behavior, including physical and verbal threats, by swine facility owners and/or operators and their employees. The accounts ranged from sustained tailgating; driving back and forth in front of the houses of residents who have complained; filming or photographing residents who are taking photos or videos of spraying; being yelled at; confronted in parking lots and at intersections; and threatened with guns and other physical violence.

Those interviewed stated that these are regular events, rather than an exception, creating a climate where residents believe that if they file an environmental complaint with NC DEQ, they will likely be retaliated against by neighboring swine facility operators or employees. The Riverkeepers stated that they are subjected to this type of harassment and intimidation two or three times every couple of weeks. Particularly egregious instances brought to ECRCO's attention include a local industrial swine facility operator entering the home of an elderly African American woman and shaking the chair she sat in while threatening her and her family with physical violence if they continued to complain about the odors and spray; the firing of a gun in the air when an African American REACH member tried to speak to a person sitting on their porch; and a truck that sped up and swerved toward a Riverkeeper who was standing on the side of a public road teaching a group of volunteers how to sample water from public ditches. Those interviewed believe that the NC DEQ's lack of response to their complaints lends to the hostile environment and emboldens local facility owners and operators to act in a threatening and intimidating manner.

ECRCO has grave concerns about these reports indicating a potential hostile and intimidating environment for anyone seeking to provide relevant information to NC DEQ or EPA. Also, ECRCO is concerned about the circumstances surrounding the attendance by pork industry representatives during the mediation session.

Under certain circumstances, Title VI's prohibition on retaliation extends to third parties, which may include lower-level recipient employees, program beneficiaries or participants, organizations with a relationship to the recipient such as contractors, and others. EPA Title VI regulations provide that "[n]o recipient or *other* person" may retaliate. 7 C.F.R. § 7.100. Recipients themselves have two key obligations related to third party retaliation: first, to protect individuals from potential retaliation, recipients are obligated to keep the identity of complainants confidential except to the extent necessary to carry out the purposes of the Title VI regulations, including conducting investigations, hearings, or judicial proceedings; and second, recipients must investigate and respond when a third party engages in retaliatory conduct that Title VI prohibits. As with other types of third party conduct, such as harassment, the extent of the recipient's obligation is tied to the level of control it has over the bad actor and the environment in which the bad acts occurred. *See Davis v. Monroe Cty. Bd. of Educ.*, 526 U.S. 629, 644 (1999). EPA makes these determinations on a case-by-case basis in light of the facts and totality of circumstances in a particular case.

NC DEQ's Response to the Complaint[14]

In part, NC DEQ's December 5, 2016 letter responding to the Complaint reiterated arguments in favor of dismissal previously submitted to ECRCO by letter dated September 2, 2016. ECRCO has considered the information in both letters concerning the alleged reduction of adverse impacts by the permit renewal. As ECRCO pointed out previously, NC DEQ itself explained that the majority of the changes from the 2009 permit to the "current permit are structural and grammatical in nature"[15] and "do not make the Permit more stringent, costly or burdensome."[16] NC DEQ's responses did not state or explain how the 2014 Permit will reduce adverse impact from the source, significantly or otherwise; therefore, as stated in ECRCO's letter dated October 5, 2016, ECRCO does not believe that the argument constitutes a proper basis for dismissal of the complaint.

Similarly, NC DEQ's December 5, 2016 letter raised again a concern that the Complainants did not pursue an administrative appeal of the Swine Waste General Permit. NC DEQ explained that the permit appeal process under state law is an appropriate forum for "those who believe that the terms of the General Permit failed to comply with state law, or if a more effective means of pollution control should have been incorporated into the General Permit."[17] The allegation raised to EPA by the Complainants is that the Swine Waste General Permit fails to comply with federal law, namely Title VI of the Civil Rights Act of 1964. For almost 30 years, recipients of EPA financial assistance have been required under EPA's Title VI implementing regulation to have in place a grievance process. 40 C.F. R. § 7.90. The NC DEQ administrative forum to investigate and resolve exactly the issues of discrimination alleged in the Complaint that should have been available to Complainants did not exist when they filed their Complaint with EPA. Regardless, as NC DEQ previously acknowledged in its October 5, 2016 letter, there is no requirement under Title VI that Complainants exhaust administrative remedies before filing a discrimination complaint with EPA.

NC DEQ's response did not deny or refute the allegation that the industrial hog facilities operating under the Swine Waste General Permit were creating discriminatory impacts, rather, NC DEQ points to siting decisions by operators and changing demographics as reasons why certain communities may be more impacted than others. The impacts of concern in this investigation flow from the operation of the facilities. While an industrial swine facility operator may apply for an individual permit or certificate of coverage to operate in a particular location, it is NC DEQ that determines whether that facility will be allowed to operate and under what type of permit and its conditions.

NC DEQ also pointed out that the population has grown and the demographics have changed in areas of high concentration of industrial swine facilities since the first Swine Waste General

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[14] ECRCO is not specifically addressing all of the points NC DEQ raised in its December 5, 2016 letter, but this should not be interpreted as ECRCO accepting those arguments.

[15] State of North Carolina, Department of Environmental and Natural Resources, *Report of the Proceedings on the Proposed Renewal of the State General Permits for Animal Feeding Operations, Public Meeting, November 12, 2013, Statesville, North Carolina, Public Meeting, November 14, 2013, Kenansville, North Carolina,*" p. 4.

[16] *Id.*, at pp. 5 and 8.

[17] Letter to Lilian S. Dorka, Acting Director, EPA Office of Civil Rights from Sam M. Hayes, General Counsel, North Carolina Department of Environmental Quality (Dec. 5, 2016), at 2.

Permit was issued. NC DEQ discussed the population growth in Duplin and Sampson Counties, highlighting in particular the rapid growth of the Latino population, and speculated that the population growth may have been due to jobs created by the industrial hog industry. The reasons for an increase in the minority population in the past 20 plus years in Duplin and Sampson Counties does not change NC DEQ's obligation to ensure that its current programs and activities do not have the effect of subjecting individuals to discrimination based on race, color or national origin.

NC DEQ requested information ECRCO has on anecdotal as well as systemic concerns relative to the Swine Waste General Permit Program. With regard to concerns about individual facilities, based on interviews of Riverkeepers working in eastern North Carolina, it is our understanding that for more than a decade they have provided NC DEQ documentation of hundreds of instances of waste spray or drift entering play areas; landing on people in their gardens, on their cars, and on their houses; runoff of hog waste entering streams and ditches; and improper spraying of waste after issuance of a National Weather Service Flood Watch. Riverkeepers stated they have provided NC DEQ the information through eyewitness accounts, photographs with time, date, and GPS coordinates embedded in the metadata, and/or video. Some of this information has been shared with ECRCO as well. Witnesses have stated that, to their knowledge, very few of these reports have received any mitigating action or resulted in enforcement action by NC DEQ. The temporal and geographic breadth of the anecdotal instances documented by Riverkeepers, points to systemic issues about which NC DEQ is aware.

Nondiscrimination Procedural Safeguards

At the time the Complaint was filed, NC DEQ was not in compliance with EPA's longstanding requirements under 40 C.F.R. Part 7, Subpart D which form the foundational elements of a recipient's program to implement the federal non-discrimination statutes.[18] These regulatory requirements include a continuing notice of non-discrimination under 40 C.F.R. § 7.95, grievance procedures available to the public, and the designation of at least one person to coordinate its efforts to comply with its non-discrimination obligations under 40 C.F.R. § 7.85(g).

At some point during the summer of 2016, NC DEQ appears to have begun the process of establishing its non-discrimination program. However, it is unclear whether NC DEQ has put in place the foundational elements of a properly functioning nondiscrimination program. ECRCO has attached a Procedural Safeguards Checklist (Attachment C) to assist NC DEQ in evaluating whether it has in place the appropriate foundational elements to ensure that it will meet its obligations under the federal nondiscrimination statutes.

Mitigation

As NC DEQ's December 5, 2016 letter noted, the study of the feasibility of environmentally superior swine waste technologies to the lagoon and spray field method began back in 2000.

[18] Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, the Age Discrimination Act of 1975, Section 13 of Federal Water Pollution Control Act of 1972, and Title IX of the Education Amendments of 1972 (hereinafter referred to collectively as the federal non-discrimination statutes).

Some reviews of particular technologies were concluded more than a decade ago. According to the designee who made the decisions regarding the economic and environmental feasibility of the technologies, "[S]ubsequent research has focused on improving the economics of targeted technologies while maintaining the environmental performance."[19] EPA's ORD found in its review of reports discussed above that a number of risk management options are available to reduce potential health risks to nearby communities. EPA, USDA, and academia have continued to work on new processes, methods, and technologies to reduce impacts from industrial swine operations and waste since the review of available technology mentioned in NC DEQ's letter was completed.

Recommendations

ECRCO has not concluded its investigation and this letter does not contain ultimate findings of facts or law. Rather, ECRCO has summarized some of the information gathered to date to explain why ECRCO continues to be concerned about possible discriminatory impacts.

The totality of the information ECRCO has collected to date in its investigation, including NC DEQ's response to the complaint, indicates that the types of adverse impacts described above are being felt by large segments of the communities of color and are potential evidence of systemic concerns, not purely anecdotal claims. The information raises a concern that Swine Waste General Permit Program may run afoul of Title VI and EPA's Title VI regulations. NC DEQ's responses thus far have not provided a reason to dismiss the complaint or halt the investigation, nor has the information or arguments provided served to diminish ECRCO's level of concern.

On this basis, EPA makes a series of preliminary recommendations and requests a meeting to explore informal resolution. The recommendations are designed to focus an inquiry that will help them determine whether the problems are being caused by: (1) structural problems with the General Permit Program; (2) a lack of enforcement of the requirements of the permit (for example, no odors, no discharges, no spray beyond borders); or, (3) both.

ECRCO recommends that NC DEQ:

- Conduct an assessment of current Swine Waste General Permit to determine what changes to the Permit should be made in order to substantially mitigate adverse impacts to nearby residents. Determine which changes are currently within NC DEQ's authority to make and develop a timetable for adopting them. For Permit changes necessary to substantially mitigate the adverse impacts that NC DEQ cannot adopt, determine the source of the impediment to their adoption.
- Conduct an assessment of current regulations applicable to facilities operating under the Swine Waste General Permit to determine what if any changes to the regulations would be required to substantially mitigate adverse impacts to nearby residents. Determine which changes are currently within NC DEQ's authority to make and develop a timetable

[19] Williams, C.M. Williams, "*C.M. "Mike" Williams: Waste economics.*" The News & Observer, 8 June 2015. http://www.newsobserver.com/opinion/letters-to-the-editor/article23534074.html.

to adopt them. For regulatory changes necessary to substantially mitigate the adverse impacts that NC DEQ cannot adopt, determine the source of the impediment to their adoption.

- Evaluate the feasibility of risk management options available to reduce adverse impacts to nearby communities, including covering the waste lagoons; not spraying in the evenings and on weekends; not using dead boxes; and others described in this letter.
- Conduct an assessment of current mitigation technologies that would satisfy NC DEQ's performance criteria for new or expanding industrial swine operations and what if any impediments exist to adopting those technologies.
- Conduct a self-evaluation of the sufficiency of NC DEQ's enforcement and compliance efforts for existing rules governing the operation of its Swine Waste Management Program, including its response to odor and adverse health effects complaints, to determine whether implementation of any corrective measures are necessary including those to ensure a prompt and appropriate response to odor and other complaints. Determine which corrective measures are currently within NC DEQ's authority to make and develop a timetable for adopting them.
- Conduct an evaluation of NC DEQ's current policies and adjust them as appropriate to ensure the protection of confidentiality and identities of residents who provide information to NC DEQ about either environmental or civil rights complaints.
- Conduct a self-evaluation of its new non-discrimination program using the attached Procedural Safeguards Checklist to determine whether it has in place all the foundational elements listed to ensure that NC DEQ will meet its obligations under the federal nondiscrimination statutes. If any of the elements are not in place, NC DEQ should correct those deficiencies.

ECRCO looks forward to working with NC DEQ and would like to discuss with NC DEQ as soon as possible: the concerns previously outlined regarding the impacts on residents and communities; any additional information NC DEQ believes is relevant to the issue of whether Title VI has been violated; ECRCO's preliminary recommendations; NC DEQ's non-discrimination program; and the potential for informal resolution of this Complaint.

I will be contacting you in the next day or so to schedule a meeting to occur in the next two weeks. It is our goal to be able to reach informal resolution as soon as possible. We believe that through productive conversations over the next 60 days, we can negotiate an Informal Resolution Agreement that would address the concerns discussed in this letter and that would include a plan for moving forward on the above recommendations. If after discussion with NC DEQ, ECRCO does not believe informal resolution is possible, ECRCO will move forward to conclude its

investigation and issue formal findings. If you have any questions, please feel free to contact me at (202) 564-9649, by e-mail at dorka.lilian@epa.gov, or U.S. mail at U.S. EPA, Office of General Counsel, External Civil Rights Compliance Office (Mail Code 2310A), 1200 Pennsylvania Avenue, N.W., Washington, D.C., 20460.

Sincerely,

Lilian S. Dorka
Director
External Civil Rights Compliance Office
Office of General Counsel

Cc:

Elise B. Packard
Associate General Counsel for Civil Rights and Finance
U.S. EPA Office of General Counsel

Kenneth Lapierrre
Assistant Regional Administrator
U.S. EPA Region 4

Attachments

ATTACHMENT A

1. Wing, Steve, et al., *Environmental Injustice in North Carolina's Hog Industry*, 108 Envtl. Health Perspectives 225 (2000)
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ATTACHMENT B

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5. Hribar, J.B., 2010. *Understanding Concentrated Animal Feeding Operations and Their Impact on Communities*. NALBOH, Bowling Green, OH.
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7. NRC, 2003. *Air Emissions from Animal Feeding Operations: Current Knowledge, Future Needs*. National Academies Press, Washington, D.C.

ATTACHMENT C

CHECK LIST FOR PROCEDURAL SAFEGUARDS FOR RECIPIENTS FEDERAL NON-DISCRIMINATION OBLIGATIONS

Federal Non-Discrimination Statutes: Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, the Age Discrimination Act of 1975, Section 13 of Federal Water Pollution Control Act of 1972, and Title IX of the Education Amendments of 1972.[20]

Item	Yes & Supporting Documentation	Not Yet	Checking
Notice of Non-Discrimination under the Federal Non-Discrimination Statutes[21]			
See attachment for recommended text of notice			
The non-discrimination notice is posted:			
• in a prominent location in your offices and facilities			
• prominently on your website			
• in any publications			
Grievance Procedures for Complaints filed under the Federal Non-Discrimination Statutes[22]			
A grievance procedure that:			
• Clearly identifies the Non-Discrimination Coordinator, including contact information			
• Explains the role of the Non-Discrimination Coordinator relative to the coordination and oversight of the grievance procedures			
• States who may file a complaint under the procedures			
• Describes which formal and informal processes are available, and the options for complainants in pursuing either			

[20] 40 C.F.R. § 7.85(g)
[21] 40 C.F.R. § 7.95(a).
[22] 40 C.F.R. § 7.90.

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Item	Yes & Supporting Documentation	Not Yet	Checking
• Explains that an appropriate, prompt and impartial investigation of any allegations filed under federal non-discrimination statutes will be conducted			
• States that the preponderance of the evidence standards will be applied during the analysis of the complaint			
• Contains assurances that retaliation is prohibited[23] and that claims of retaliation will be handled promptly if it occurs			
• States that written notice will be promptly provided about the outcome of the investigation, including whether discrimination is found and the description of the investigation process[24]			
• Is published in print in general publications distributed to the public			
Non-Discrimination Coordinator[25]			
At least one Non-Discrimination Coordinator to ensure compliance with the federal non-discrimination statutes			
Non-Discrimination Coordinator or other individual responsible for:			
• Providing information internally and externally regarding rights to services, aids, benefits, and participation without regard to race, national origin, color, sex, disability, age or prior opposition to discrimination			
• Providing notice of your Agency's formal and informal grievance processes and the ability to file a discrimination complaint			
• Establishing grievance policies and procedures or mechanisms (e.g., an investigation manual)			
• Tracking all complaints filed with your Agency under federal non-discrimination statutes including any patterns or systemic problems			

[23] 40 C.F.R. § 7.100.

[24] Whether OCR considers complaint investigations and resolutions to be "prompt" will vary depending on the complexity of the investigation and the severity and extent of the alleged discrimination. For example, the investigation and resolution of a complaint involving multiple allegations and multiple complainants likely would take longer than one involving a single allegation of discrimination and a single complainant.

[25] 40 C.F.R. § 7.85(g).

ED_001503_00012960-00019

Item	Yes & Supporting Documentation	Not Yet	Checking
• Semiannual reviews of all complaints filed with your Agency under federal non-discrimination statutes in order to identify and address any patterns or systemic problems			
• Appropriate training for your Agency's employees on your Agency's non-discrimination policies and procedures and obligations to comply with federal non-discrimination statutes			
• Updating complainants on the progress of their complaints filed with your Agency under federal non-discrimination statutes and any determinations made			
• Periodic evaluations of the efficacy of your Agency's efforts to provide services, aids, benefits, and participation in any of your Agency's programs or activities without regard to race, national origin, color, sex, disability, age or prior opposition to discrimination			
Public Participation			
Written and published public participation process/procedures that provide that when your Agency prepares a public participation plan for a specific action, it will include:			
• A description of the community (including demographics, history, and background)			
• A contact list of Agency officials with phone numbers and email addresses to allow the public to communicate via phone or internet			
• A list of past and present community concerns (including any complaints filed under the federal non-discrimination statutes)			
• A detailed plan of action (outreach activities) your Agency will take to address concerns			
• A contingency plan for unexpected events			
• Location(s) where public meetings will be held (consider the availability and schedules of public transportation			

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Item	Yes & Supporting Documentation	Not Yet	Checking
• Contact names for obtaining language assistance services for limited-English proficient persons, including, translation of documents and/or interpreters for meetings			
• Appropriate local media contacts (based on the culture and linguistic needs of the community			
• Location of the information repository			
Access To Programs And Activities by Persons with Limited English Proficiency			
Has your Agency conducted an appropriate analysis described in OCR's LEP Guidance found at 69 FR 35602 (June 25, 2004) and http://www.lep.gov to determine what language services it may need to provide to ensure that individuals with limited-English proficiency can meaningfully participate in the process?			
Has your Agency developed a language access plan consistent with the details found in OCR's training module for LEP. http://www.epa.gov/civilrights/lepaccess.htm?			
Does your Agency have written and published procedures that:			
• Ensure meaningful access to all of your Agency's programs and activities to persons with limited-English proficiency and individuals with disabilities			
• Make communities you serve aware that foreign language services are available			
• Translate standardized documents			
• Provide for simultaneous oral interpretation of live proceedings such as town hall meetings or public hearings			
Access To Programs And Activities by Persons with Disabilities			
Does your Agency have written and published procedures to ensure to provide access to your programs, services, and activities for individuals with disabilities that:			
• Provides at no cost appropriate auxiliary aids and services including, for example, qualified interpreters to individuals who are deaf or			

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Item	Yes & Supporting Documentation	Not Yet	Checking
hard of hearing, and to other individuals as necessary to ensure effective communication or an equal opportunity to participate fully in the benefits, activities, programs and services provided by your Agency in a timely manner and in such a way as to protect the privacy and independence of the individual			
• Ensures that your Agency's facilities and non-Agency facilities utilized by your Agency (*e.g.*, if your Agency holds a public hearing at a school) are physically accessible for individuals with disabilities			
• Makes communities you serve aware that services for individuals with disabilities are available			

NOTICE OF NON-DISCRIMINATION RECOMMENDED TEXT

[Agency Name] does not discriminate on the basis of race, color, national origin, disability, age, or sex in the administration of its programs or activities, as required by applicable laws and regulations.

[Insert name and title of Non-Discrimination Coordinator] is responsible for coordination of compliance efforts and receipt of inquiries concerning non-discrimination requirements implemented by 40 C.F.R. Part 7 (Non-discrimination in Programs or Activities Receiving Federal Assistance from the Environmental Protection Agency), including Title VI of the Civil Rights Act of 1964, as amended; Section 504 of the Rehabilitation Act of 1973; the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and Section 13 of the Federal Water Pollution Control Act Amendments of 1972.

If you have any questions about this notice or any of [Agency Name]'s non-discrimination programs, policies or procedures, you may contact:

[Insert name and title of Non-Discrimination Coordinator]
[Insert Agency Name and Address]
[Insert phone number of Non-Discrimination Coordinator]
[Insert email address of Non-Discrimination Coordinator]

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If you believe that you have been discriminated against with respect to a [Agency Name] program or activity, you may contact the [insert title of Non-Discrimination Coordinator] identified above or visit our website at [insert] to learn how and where to file a complaint of discrimination.

ED_001503_00012960-00023

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

EXTERNAL CIVIL RIGHT COMPLIANCE OFFICE
OFFICE OF GENERAL COUNSEL

January 12, 2017

Return Receipt Requested
Certified Mail# 7015 3010 0001 1267 5140

In Reply Refer to:
EPA File No. 11R-14-R4

Marianne Engelman Lado
Visiting Clinical Professor of Law
Yale Law School
127 Wall Street
New Haven, CT 06511
(203) 432-2184
(cell) (917) 608-2053

Jonathan J. Smith
Associate Attorney
Earthjustice Northeast Office
48 Wall Street, 19th Floor
New York, NY 10005

Elizabeth Haddix
Senior Staff Attorney
UNC Center for Civil Rights
323 West Barbee Chapel Rd.
Chapel Hill, NC 27517

Re: Copy of Letter of Concern

Dear Ms. Lado, Mr. Smith, and Ms. Haddix:

Consistent with United States Environmental Protection Agency's External Civil Rights Compliance Office's (ECRCO) goal to promote appropriate involvement by complainants and recipients in the external complaint process, we are writing to provide you a copy of the enclosed Letter of Concern to the North Carolina Department of Environmental Quality, related to administrative complaint No. 11R-14-R4.

Please note that ECRCO considers this letter part of its ongoing investigation. So, while we are providing the enclosed letter to the Complainants, ECRCO does not consider this letter a public document.

If you have any questions, please feel free to contact me at (202) 564-9649, by e-mail at dorka.lilian@epa.gov, or U.S. mail at U.S. EPA, Office of General Counsel, External Civil Rights Compliance Office (Mail Code 2310A), 1200 Pennsylvania Avenue, N.W., Washington, D.C., 20460.

Sincerely,

Lilian S. Dorka
Director
External Civil Rights Compliance Office
Office of General Counsel

Cc:

Elise B. Packard
Associate General Counsel for Civil Rights and Finance
U.S. EPA Office of General Counsel

Kenneth Lapierrre
Assistant Regional Administrator
U.S. EPA Region 4

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

EXTERNAL CIVIL RIGHT COMPLIANCE OFFICE
OFFICE OF GENERAL COUNSEL

January 12, 2017

Return Receipt Requested
Certified Mail# 7015 3010 0001 1267 5133

In Reply Refer to:
EPA File No. 11R-14-R4

William G. Ross, Jr.
Acting Secretary
North Carolina Department of Environmental Quality
1601 Mail Service Center
Raleigh, NC 27699-1611

Re: Letter of Concern

Dear Acting Secretary Ross:

We are writing to you to provide the North Carolina Department of Environmental Quality (NC DEQ) preliminary information related to the United States Environmental Protection Agency's (EPA) External Civil Rights Compliance Office's[1] (ECRCO) investigation into alleged discriminatory impacts from NC DEQ's operation of the Swine Waste Management System General Permit (Swine Waste General Permit). ECRCO has not concluded its investigation of EPA File No. 11R-14-R4 (Complaint) or reached final conclusions of fact or law. However, in light of the preliminary information gathered, ECRCO has deep concern about the possibility that African Americans, Latinos, and Native Americans have been subjected to discrimination as the result of NC DEQ's operation of the Swine Waste General Permit program, including the 2014 renewal of the Swine Waste General Permit.

EPA recognizes that there is new leadership at NC DEQ who were not involved in the events and correspondence described below relating to this Complaint and who will understandably need to come up to speed. ECRCO looks forward to sitting down with NC DEQ's new leadership in the next few weeks to provide any necessary background on NC DEQ's obligations under the federal nondiscrimination statutes and to discuss issues raised by ECRCO's investigation to date; any additional information NC DEQ may have relevant to the issues under investigation; the recommendations ECRCO has made below; and how to move forward on a constructive path to informally resolve the Complaint in the near future and ensure NC DEQ is in compliance with the applicable nondiscrimination statutes and regulations.

[1] Formerly the Office of Civil Rights. To eliminate confusion, except where quoting another document, this letter will use the Office's current name, rather than its name at the time of any particular action or correspondence.

Procedural Background of Complaint

On September 3, 2014, Earthjustice filed a complaint under Title VI of the Civil Rights Act of 1964, as amended, 42 U.S.C. §§ 2000d et seq., and the EPA's nondiscrimination regulations found at 40 C.F.R. Part 7, on behalf of the North Carolina Environmental Justice Network, Rural Empowerment Association for Community Help (REACH), and the Waterkeeper Alliance, Inc. alleging discrimination based on race and national origin by NC DEQ. The complaint alleged that NC DEQ's 2014 renewal of the Swine Waste General Permit without adequate measures to control, dispose of, and monitor animal waste from industrial swine feeding operations subjects African Americans, Latinos, and Native Americans to discriminatory impacts (*e.g.*, health issues, noxious odors, nuisances, increased expenses, social and psychological harms, declining property values).

On February 20, 2015, EPA opened an investigation into:

> Whether the North Carolina Department of Environmental Quality's (NC DEQ) regulation of swine feeding operations discriminates against African Americans, Latinos, and Native Americans on the basis of race and national origin in neighboring communities and violates Title VI of the Civil Rights Act of 1964 and the Environmental Protection Agency's implementing regulation.

On March 6, 2015, the Complainants and NC DEQ entered into an Alternative Dispute Resolution (ADR) process funded by EPA. ECRCO placed the investigation on hold pending the outcome of the ADR process. On March 7, 2016, the Complainants informed ECRCO that they were withdrawing from the ADR process.

On May 5, 2016, ECRCO informed NC DEQ that the ADR process between NC DEQ and the Complainants concluded without resolution; therefore, consistent with ECRCO procedures, ECRCO's investigation was reinitiated. On July 11, 2016, the Complainants filed an additional complaint alleging NC DEQ violated EPA's regulation prohibiting retaliation, intimidation, and harassment of Complainants (40 C.F.R. § 7.100). Among other events, Complainants point to events involving the Pork Councils' attempt to intervene at the January 2016 ADR session.

On August 1, 2016, NC DEQ submitted a response to the retaliation allegations. On August 2, 2016, ECRCO informed NC DEQ that it will also investigate:

> Whether NCDEQ's actions or inactions, including those associated with the presence and activities of the Pork Councils related to the January 2016 mediation session, violated 40 C.F.R § 7.100 which prohibits intimidating, threatening, coercing, or engaging in other discriminatory conduct against any individual or group because of actions taken and/or participation in an action to secure rights protected by the non-discrimination statutes OCR enforces.

On September 2, 2016, NC DEQ requested that ECRCO dismiss the original complaint. After reviewing the information provided by NC DEQ, ECRCO notified NC DEQ that the Complaint

would not be dismissed. On December 5, 2016, NC DEQ submitted a response to the Complaint.

ECRCO's investigation is being conducted under the authority of Title VI of the Civil Act of 1964, and EPA's nondiscrimination regulations (40 C.F.R. Part 7), and consistent with ECRCO's Interim Case Resolution Manual (https://www.epa.gov/ocr/case-resolution-manual) Title VI provides that "[n]o person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." 42 U.S.C. § 2000d. As implemented by EPA's regulation, these prohibitions include intentional discrimination as well as practices that have a discriminatory effect on the bases of race, color, or national origin. See 40 C.F.R. §§7.35(a), 7.35(b). The EPA regulation at §7.35 (b) prohibits a recipient from using criteria or methods of administering its program or activity which have the effect of subjecting individuals to discrimination. The EPA regulation also prohibits intimidation and retaliation against any individual or group for the purpose of interfering with a right protected by Title VI or because the individual has "filed a complaint, or has testified, assisted or participated in any way in an investigation, proceeding, or hearing" under EPA's regulation or has opposed any practice prohibited by the regulation. See 40 C.F.R. § 7.100.

ECRCO's investigation thus far has included an on-site visit to interview residents; reviewing information submitted by the Complainants including declarations prepared by residents and other witnesses; reviewing scientific and other literature and interviewing the authors when appropriate, and, a review of NC DEQ's responses to the Complaint dated August 1, 2016, September 2, 2016, and December 5, 2016. NC DEQ's December 5, 2016, letter requested that ECRCO "...provide any relevant information in its possession on the issue of discrimination by the State's regulation of Swine feeding operations." Below is a summary of information gathered thus far through ECRCO's investigation.

Adverse Impacts from Industrial Swine Operations on Communities of Color

On-Site Interviews and Declarations

ECRCO conducted an on-site visit to North Carolina (November 13-15, 2016) and interviewed over 60 residents living near industrial swine operations permitted under the Swine Waste General Permit. ECRCO's interviews were conducted mostly in Duplin and Sampson counties which have the highest concentration of industrial swine operations. To investigate the effects of the permitting program more broadly throughout the state, ECRCO also conducted interviews in other counties including Northampton County on the Virginia border and Pender County near the South Carolina border.

Some of the people interviewed had previously submitted declarations to ECRCO as exhibits to the Title VI complaint, some had not. The issues raised in the declarations and the impacts they discussed are similar or identical to those heard during the interviews. Many of those interviewed who had previously provided declarations provided updates to their declarations. ECRCO found credible all those interviewed thus far in the investigation. So far, ECRCO has heard in writing and/or orally from 85 witnesses in North Carolina who live near and described problems caused by their proximity to the industrial hog operations.

Residents, many of whom have lived in these communities for generations, described problems caused by their proximity to the industrial hog operations that have negatively changed their lives and communities, including those impacts described in studies referenced or discussed below. The residents described an overpowering stench, pests -- including a constant large number of flies, and the truck traffic all associated with the hog operations have forced residents to keep doors and windows closed and significantly limit any outdoor activity. Residents said the stench permeates homes, cars, and clothing. Some residents said the strength of the odor can be so strong it causes gagging, nausea and/or vomiting. For some residents who live near large numbers of industrial swine operations, they said stench is a weekly event lasting several days. They also stated they have no warning of when confinement house fans, spraying of the hog waste, or trucks transporting live or dead hogs will again bring the stench and actual waste onto their homes, property or themselves. Some described feeling as though they are prisoners in their own homes.

Residents described the loss of community that has occurred since the industrial hog farms began operating. They reported that young adults leave and do not return because of the odors, fear of health impacts from the air and drinking water, and other impacts. Prior to the arrival of the industrial hog operations, many of their family, community, and church gatherings had been held outdoors. Now they said those events are rarely held outdoors or if attempted outdoors, they are marred or forced to end early due to odors, flies, and other impacts.

Residents described increases in cases and severity of asthma and other respiratory illnesses, nausea, headaches and other health conditions. They stated these impacts have been compounded by the increase in industrial poultry operations, as well as the operation of landfills and waste disposal sites for hog sludge and carcasses. Those who had hunted and fished for both food and enjoyment, said they no longer do so because of the odors and fear of the contamination of wild sources of food such as fish. Residents stated they no longer keep gardens or grow their own vegetables for fear of contamination. Some residents are still on well water and are concerned about the safety of their drinking water. Some residents would prefer to use their private wells rather than public drinking water, but said they have either been told not to drink it or are afraid that it is contaminated. Residents also discussed increased expenses from buying and using public water, bottled water, clothes dryers, air fresheners, pesticides, air conditioning units, and food.

When asked whether they had filed complaints with NC DEQ or local governments about the odors, pests, and waste sprayed on them or their property, some residents said they did not know how or where to file complaints. ECRCO was told the filing of complaints with NC DEQ would be pointless and has resulted in retaliation, threats, intimidation, and harassment by swine facility operators and pork industry representatives. Several residents said that for more than 15 years, the government has been well aware of the conditions they have to live with, but has done nothing to help, so complaining to NC DEQ would be futile.

ECRCO also interviewed residents who live near an industrial swine operation that began operation using the lagoon and spray field method under a Certificate of Coverage under the Swine Waste General Permit. When discussing the impacts that occurred while the facility operated under the General Permit, the residents described the same impacts as those currently

living near facilities operating under the General Permit, including nausea; headaches; odors that permeated their homes and prevented them from enjoying their yards and the outdoors; concerns about impacts to groundwater and surface water; and increased numbers of flies and other pests.

After several years of operation, the operator installed innovative technologies and practices to reduce the odor and other impacts from his operation including covering the waste lagoons; not spraying in the evenings and on weekends; and not using dead boxes. When asked to describe the current impacts from that industrial swine operation, for the most part the residents who live nearby said they rarely notice intense odors and that the number of flies has been greatly reduced. The exception was that one bordering neighbor said that the smell was unbearable during spraying. Other neighbors pointed out that the smell could also be from other industrial swine operations near that resident's property that still employ open lagoons and spray fields. ECRCO and other EPA staff who toured the operation including the confinement houses and the edge of the lagoons were surprised at how little odor there was given the number of swine housed there at that time and the presence of more than one waste lagoon.

Other Information on Adverse Impacts of Industrial Swine Operations on Nearby Residents

EPA recognizes that industrial hog operations have a negative impact on nearby residents, particularly with respect to objectionable odors and other nuisance problems that can affect their quality of life. (EPA, *Animal Feeding Operations Consent Agreement and Final Order*, 70 FR 4957, 4959 (Jan. 31, 2005)). The adverse impacts of offensive odors from North Carolina's industrial hog operations have been a known issue for more than 20 years. In 1994, the North Carolina legislature established a Blue Ribbon Panel, the Swine Odors Task Force, to study "the problem of swine odors and how to reduce them."[2] The report of the Swine Odors Task Force stated protests had been "numerous and well publicized."[3]

In part to protect North Carolina's travel and tourism industry and allow time for the completion of the studies of odor and other problems associated with swine operations, the state legislature implemented a moratorium effective March 1, 1997, on the construction or expansion of swine operations[4] that use "an anaerobic lagoon as the primary method of treatment and land application of waste by means of a spray field as the primary method of waste disposal."[5] Any new or expanding swine operations were required to eliminate or reduce a number of impacts from the lagoon and spray field methods including substantially eliminating ammonia emissions and odors detectable beyond the boundaries of the swine operation.[6] The moratorium was made permanent in 2007. However, the industrial hog operations using the lagoon spray field configuration already operating at the time of the moratorium were allowed to continue to operate under the Swine Waste General Permit without the requirements to substantially eliminate ammonia emissions and odors. Today, in a handful of counties mostly in eastern North

[2] Dr. Johnny C. Wynne, et al., *Options for Managing Odor... a report from the Swine Odor Task Force (March 1, 1995)*, NORTH CAROLINA AGRICULTURAL RESEARCH SERVICE, N.C. STATE UNIV., *available at* http://www.mtcnet.net/~jdhogg/ozone/odor/swineodr.html#notsimple

[3] *Id.*

[4] S.L. 1997-458, H.B. 515, § 1.1(a).

[5] G.S. § 143-215.10I.

[6] G.S. § 143-215.10I (b)(2)-(3).

Carolina there is a total of more than 9 million hogs allowed in the more than 2000 industrial hog facilities operating under the Swine Waste General Permit.

North Carolina established a rule specifically to control objectionable odors from industrial swine operations.[7] "Objectionable odor" means any odor present in the ambient air that by itself, or in combination with other odors, is or may be harmful or injurious to human health or welfare, or may unreasonably interfere with the comfortable use and enjoyment of life or property. Odors are harmful or injurious to human health if they tend to lessen human food and water intake, interfere with sleep, upset appetite, produce irritation of the upper respiratory tract, or cause symptoms of nausea, or if their chemical or physical nature is, or may be, detrimental or dangerous to human health."[8] North Carolina's definition of "objectionable odor" encompasses the panoply of negative effects experienced by North Carolina residents, as told to ECRCO and discussed above.

Review of Reports and Studies

The adverse impacts on nearby residents from the lagoon spray field method of treatment and disposal of waste from industrial swine operations are documented in numerous peer reviewed scientific studies, including more than thirty conducted in North Carolina.[9] At ECRCO's request, EPA's Office of Research and Development (ORD) recently reviewed seven reports published by or with federal agencies.[10] ORD stated that the reports provide consistent support for the occurrence of potential health hazards (*e.g.*, eye, nose, and throat irritation; headaches; respiratory effects including asthma exacerbation; waterborne disease) at industrial swine operations and in their waste. Even while there is significant uncertainty regarding the levels of exposure in nearby communities to the identified contaminants and the risk of health effects attributable to those exposures, the risk for specific health effects in communities near industrial swine operations is a concern.

North Carolina's 1994 Swine Odors Task Force stated "it is not surprising to learn that living near a swine operation can affect mental health" when discussing a Duke University study of "the moods of people exposed to odors from commercial swine operations in North Carolina. Forty-four neighbors of hog operations . . . had less vigor and were significantly more tense, depressed, angry, fatigued, and confused."[11]

Additionally, ECRCO considered the findings of the analysis prepared by Drs. Steve Wing and Jill Johnston, *Industrial Hog Operations in North Carolina Disproportionately Impact African-Americans, Hispanics and American Indians*, (revised October 19, 2015) (*Complainants' Disproportionate Impact Analysis*). While the *Complainants' Disproportionate Impact Analysis* has not undergone peer review, it uses a study protocol and methodology that are substantially similar to peer reviewed studies by Wing et al. and Johnston et al.[12] The

[7] 15A NCAC 02D.1802(a).
[8] 15A NCAC 02D.1801(9).
[9] *See* Attachment A. Additional studies can be made available.
[10] *See* Attachment B.
[11] *See* Wynne, et al., *supra* note 3.
[12] *See* Steve Wing, et al., *Environmental Injustice in North Carolina's Hog Industry* (Mar. 2000), ENVIRONMENTAL HEALTH PERSPECTIVES, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1637958/; Jill E. Johnston, et al.,

Complainants' Disproportionate Impact Analysis concludes that the impacts from the manner in which waste is disposed of, and other impacts tied to industrial swine facilities operating under the Swine Waste General Permit, detrimentally affect those who live in neighboring properties and communities.

The *Complainants' Disproportionate Impact Analysis* also concluded, when examining those neighboring properties that African-Americans, Hispanics, and Native Americans are more likely than Whites to live near industrial swine operations granted COCs. Specifically, the *Complainants' Disproportionate Impact Analysis* concluded that, both state-wide, and in only-rural areas, African-Americans, Hispanics, and Native Americans living in North Carolina are more likely than Whites to live within 3 miles of an industrial swine operations granted COCs, and therefore suffer those detrimental effects. The *Complainants' Disproportionate Impact Analysis* looked at the steady state live weight (SSLW) of hogs within 3 miles of the center of census blocks. The SSLW was used as an indicator of density of hogs/the amount of swine feces and urine produced by the hogs in that 3-mile area. The *Complainants' Disproportionate Impact Analysis* found that for each 10 percent increase in the combined African-American, Hispanic, and Native American population and for each 10 percent increase in population for each of those census categories individually, the SSLW of hogs within 3 miles increases by anywhere from 47,000 to 165,000 pounds. This analysis concludes that there is a linear relationship between race/ethnicity and the SSLW or density of hogs.

Intimidation/Retaliation

The Complainants raised allegations of intimidation and harassment in their written submissions to ECRCO and during interviews related to the appearance of and actions by national and local representatives of the pork industry at what was to be a confidential ECRCO-sponsored alternative dispute resolution mediation session between NC DEQ and the Complainants. Complainants claim that, although NC DEQ representatives knew that complainants did not want representatives from the National Pork Producers Council and North Carolina Pork Council (Pork Councils) at this confidential meeting, NC DEQ representatives appeared to encourage their attendance and participation.

NC DEQ's responses in its letters dated August 1, 2016, and December 5, 2016, in part question whether complainants felt intimated by the Pork Council representatives' presence at the January 2016 mediation session. NC DEQ stated in both letters that "it strains credulity that these individuals were intimidated by the fact that they would be identified by representatives of organizations whom these individuals routinely criticized at public forums."[13] The following information provided to ECRCO may assist NC DEQ to better understand in part the context within which the Complainants have raised concerns about harassment, retaliation, and intimidation.

Wastewater Disposal Wells, Fracking, and Environmental Injustice in Southern Texas (Mar. 2016), AMERICAN JOURNAL OF PUBLIC HEALTH (2016), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4816143/.

[13] Letter to Lilian S. Dorka, Acting Director, EPA Office of Civil Rights from Sam M. Hayes, General Counsel, North Carolina Department of Environmental Quality (Dec. 5, 2016), at 8-9.

During interviews, residents including REACH members, and current and former Riverkeepers working in the eastern North Carolina rivers recounted first hand incidents of harassment, intimidation, and retaliatory behavior, including physical and verbal threats, by swine facility owners and/or operators and their employees. The accounts ranged from sustained tailgating; driving back and forth in front of the houses of residents who have complained; filming or photographing residents who are taking photos or videos of spraying; being yelled at; confronted in parking lots and at intersections; and threatened with guns and other physical violence.

Those interviewed stated that these are regular events, rather than an exception, creating a climate where residents believe that if they file an environmental complaint with NC DEQ, they will likely be retaliated against by neighboring swine facility operators or employees. The Riverkeepers stated that they are subjected to this type of harassment and intimidation two or three times every couple of weeks. Particularly egregious instances brought to ECRCO's attention include a local industrial swine facility operator entering the home of an elderly African American woman and shaking the chair she sat in while threatening her and her family with physical violence if they continued to complain about the odors and spray; the firing of a gun in the air when an African American REACH member tried to speak to a person sitting on their porch; and a truck that sped up and swerved toward a Riverkeeper who was standing on the side of a public road teaching a group of volunteers how to sample water from public ditches. Those interviewed believe that the NC DEQ's lack of response to their complaints lends to the hostile environment and emboldens local facility owners and operators to act in a threatening and intimidating manner.

ECRCO has grave concerns about these reports indicating a potential hostile and intimidating environment for anyone seeking to provide relevant information to NC DEQ or EPA. Also, ECRCO is concerned about the circumstances surrounding the attendance by pork industry representatives during the mediation session.

Under certain circumstances, Title VI's prohibition on retaliation extends to third parties, which may include lower-level recipient employees, program beneficiaries or participants, organizations with a relationship to the recipient such as contractors, and others. EPA Title VI regulations provide that "[n]o recipient or *other* person" may retaliate. 7 C.F.R. § 7.100. Recipients themselves have two key obligations related to third party retaliation: first, to protect individuals from potential retaliation, recipients are obligated to keep the identity of complainants confidential except to the extent necessary to carry out the purposes of the Title VI regulations, including conducting investigations, hearings, or judicial proceedings; and second, recipients must investigate and respond when a third party engages in retaliatory conduct that Title VI prohibits. As with other types of third party conduct, such as harassment, the extent of the recipient's obligation is tied to the level of control it has over the bad actor and the environment in which the bad acts occurred. *See Davis v. Monroe Cty. Bd. of Educ.*, 526 U.S. 629, 644 (1999). EPA makes these determinations on a case-by-case basis in light of the facts and totality of circumstances in a particular case.

NC DEQ's Response to the Complaint[14]

In part, NC DEQ's December 5, 2016 letter responding to the Complaint reiterated arguments in favor of dismissal previously submitted to ECRCO by letter dated September 2, 2016. ECRCO has considered the information in both letters concerning the alleged reduction of adverse impacts by the permit renewal. As ECRCO pointed out previously, NC DEQ itself explained that the majority of the changes from the 2009 permit to the "current permit are structural and grammatical in nature"[15] and "do not make the Permit more stringent, costly or burdensome."[16] NC DEQ's responses did not state or explain how the 2014 Permit will reduce adverse impact from the source, significantly or otherwise; therefore, as stated in ECRCO's letter dated October 5, 2016, ECRCO does not believe that the argument constitutes a proper basis for dismissal of the complaint.

Similarly, NC DEQ's December 5, 2016 letter raised again a concern that the Complainants did not pursue an administrative appeal of the Swine Waste General Permit. NC DEQ explained that the permit appeal process under state law is an appropriate forum for "those who believe that the terms of the General Permit failed to comply with state law, or if a more effective means of pollution control should have been incorporated into the General Permit."[17] The allegation raised to EPA by the Complainants is that the Swine Waste General Permit fails to comply with federal law, namely Title VI of the Civil Rights Act of 1964. For almost 30 years, recipients of EPA financial assistance have been required under EPA's Title VI implementing regulation to have in place a grievance process. 40 C.F. R. § 7.90. The NC DEQ administrative forum to investigate and resolve exactly the issues of discrimination alleged in the Complaint that should have been available to Complainants did not exist when they filed their Complaint with EPA. Regardless, as NC DEQ previously acknowledged in its October 5, 2016 letter, there is no requirement under Title VI that Complainants exhaust administrative remedies before filing a discrimination complaint with EPA.

NC DEQ's response did not deny or refute the allegation that the industrial hog facilities operating under the Swine Waste General Permit were creating discriminatory impacts, rather, NC DEQ points to siting decisions by operators and changing demographics as reasons why certain communities may be more impacted than others. The impacts of concern in this investigation flow from the operation of the facilities. While an industrial swine facility operator may apply for an individual permit or certificate of coverage to operate in a particular location, it is NC DEQ that determines whether that facility will be allowed to operate and under what type of permit and its conditions.

NC DEQ also pointed out that the population has grown and the demographics have changed in areas of high concentration of industrial swine facilities since the first Swine Waste General

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[14] ECRCO is not specifically addressing all of the points NC DEQ raised in its December 5, 2016 letter, but this should not be interpreted as ECRCO accepting those arguments.

[15] State of North Carolina, Department of Environmental and Natural Resources, *Report of the Proceedings on the Proposed Renewal of the State General Permits for Animal Feeding Operations, Public Meeting, November 12, 2013, Statesville, North Carolina, Public Meeting, November 14, 2013, Kenansville, North Carolina,*" p. 4.

[16] *Id.*, at pp. 5 and 8.

[17] Letter to Lilian S. Dorka, Acting Director, EPA Office of Civil Rights from Sam M. Hayes, General Counsel, North Carolina Department of Environmental Quality (Dec. 5, 2016), at 2.

Permit was issued. NC DEQ discussed the population growth in Duplin and Sampson Counties, highlighting in particular the rapid growth of the Latino population, and speculated that the population growth may have been due to jobs created by the industrial hog industry. The reasons for an increase in the minority population in the past 20 plus years in Duplin and Sampson Counties does not change NC DEQ's obligation to ensure that its current programs and activities do not have the effect of subjecting individuals to discrimination based on race, color or national origin.

NC DEQ requested information ECRCO has on anecdotal as well as systemic concerns relative to the Swine Waste General Permit Program. With regard to concerns about individual facilities, based on interviews of Riverkeepers working in eastern North Carolina, it is our understanding that for more than a decade they have provided NC DEQ documentation of hundreds of instances of waste spray or drift entering play areas; landing on people in their gardens, on their cars, and on their houses; runoff of hog waste entering streams and ditches; and improper spraying of waste after issuance of a National Weather Service Flood Watch. Riverkeepers stated they have provided NC DEQ the information through eyewitness accounts, photographs with time, date, and GPS coordinates embedded in the metadata, and/or video. Some of this information has been shared with ECRCO as well. Witnesses have stated that, to their knowledge, very few of these reports have received any mitigating action or resulted in enforcement action by NC DEQ. The temporal and geographic breadth of the anecdotal instances documented by Riverkeepers, points to systemic issues about which NC DEQ is aware.

Nondiscrimination Procedural Safeguards

At the time the Complaint was filed, NC DEQ was not in compliance with EPA's longstanding requirements under 40 C.F.R. Part 7, Subpart D which form the foundational elements of a recipient's program to implement the federal non-discrimination statutes.[18] These regulatory requirements include a continuing notice of non-discrimination under 40 C.F.R. § 7.95, grievance procedures available to the public, and the designation of at least one person to coordinate its efforts to comply with its non-discrimination obligations under 40 C.F.R. § 7.85(g).

At some point during the summer of 2016, NC DEQ appears to have begun the process of establishing its non-discrimination program. However, it is unclear whether NC DEQ has put in place the foundational elements of a properly functioning nondiscrimination program. ECRCO has attached a Procedural Safeguards Checklist (Attachment C) to assist NC DEQ in evaluating whether it has in place the appropriate foundational elements to ensure that it will meet its obligations under the federal nondiscrimination statutes.

Mitigation

As NC DEQ's December 5, 2016 letter noted, the study of the feasibility of environmentally superior swine waste technologies to the lagoon and spray field method began back in 2000.

[18] Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, the Age Discrimination Act of 1975, Section 13 of Federal Water Pollution Control Act of 1972, and Title IX of the Education Amendments of 1972 (hereinafter referred to collectively as the federal non-discrimination statutes).

Some reviews of particular technologies were concluded more than a decade ago. According to the designee who made the decisions regarding the economic and environmental feasibility of the technologies, "[S]ubsequent research has focused on improving the economics of targeted technologies while maintaining the environmental performance."[19] EPA's ORD found in its review of reports discussed above that a number of risk management options are available to reduce potential health risks to nearby communities. EPA, USDA, and academia have continued to work on new processes, methods, and technologies to reduce impacts from industrial swine operations and waste since the review of available technology mentioned in NC DEQ's letter was completed.

Recommendations

ECRCO has not concluded its investigation and this letter does not contain ultimate findings of facts or law. Rather, ECRCO has summarized some of the information gathered to date to explain why ECRCO continues to be concerned about possible discriminatory impacts.

The totality of the information ECRCO has collected to date in its investigation, including NC DEQ's response to the complaint, indicates that the types of adverse impacts described above are being felt by large segments of the communities of color and are potential evidence of systemic concerns, not purely anecdotal claims. The information raises a concern that Swine Waste General Permit Program may run afoul of Title VI and EPA's Title VI regulations. NC DEQ's responses thus far have not provided a reason to dismiss the complaint or halt the investigation, nor has the information or arguments provided served to diminish ECRCO's level of concern.

On this basis, EPA makes a series of preliminary recommendations and requests a meeting to explore informal resolution. The recommendations are designed to focus an inquiry that will help them determine whether the problems are being caused by: (1) structural problems with the General Permit Program; (2) a lack of enforcement of the requirements of the permit (for example, no odors, no discharges, no spray beyond borders); or, (3) both.

ECRCO recommends that NC DEQ:

- Conduct an assessment of current Swine Waste General Permit to determine what changes to the Permit should be made in order to substantially mitigate adverse impacts to nearby residents. Determine which changes are currently within NC DEQ's authority to make and develop a timetable for adopting them. For Permit changes necessary to substantially mitigate the adverse impacts that NC DEQ cannot adopt, determine the source of the impediment to their adoption.
- Conduct an assessment of current regulations applicable to facilities operating under the Swine Waste General Permit to determine what if any changes to the regulations would be required to substantially mitigate adverse impacts to nearby residents. Determine which changes are currently within NC DEQ's authority to make and develop a timetable

[19] Williams, C.M. Williams, "*C.M. "Mike" Williams: Waste economics.*" The News & Observer, 8 June 2015. http://www.newsobserver.com/opinion/letters-to-the-editor/article23534074.html.

to adopt them. For regulatory changes necessary to substantially mitigate the adverse impacts that NC DEQ cannot adopt, determine the source of the impediment to their adoption.

- Evaluate the feasibility of risk management options available to reduce adverse impacts to nearby communities, including covering the waste lagoons; not spraying in the evenings and on weekends; not using dead boxes; and others described in this letter.
- Conduct an assessment of current mitigation technologies that would satisfy NC DEQ's performance criteria for new or expanding industrial swine operations and what if any impediments exist to adopting those technologies.
- Conduct a self-evaluation of the sufficiency of NC DEQ's enforcement and compliance efforts for existing rules governing the operation of its Swine Waste Management Program, including its response to odor and adverse health effects complaints, to determine whether implementation of any corrective measures are necessary including those to ensure a prompt and appropriate response to odor and other complaints. Determine which corrective measures are currently within NC DEQ's authority to make and develop a timetable for adopting them.
- Conduct an evaluation of NC DEQ's current policies and adjust them as appropriate to ensure the protection of confidentiality and identities of residents who provide information to NC DEQ about either environmental or civil rights complaints.
- Conduct a self-evaluation of its new non-discrimination program using the attached Procedural Safeguards Checklist to determine whether it has in place all the foundational elements listed to ensure that NC DEQ will meet its obligations under the federal nondiscrimination statutes. If any of the elements are not in place, NC DEQ should correct those deficiencies.

ECRCO looks forward to working with NC DEQ and would like to discuss with NC DEQ as soon as possible: the concerns previously outlined regarding the impacts on residents and communities; any additional information NC DEQ believes is relevant to the issue of whether Title VI has been violated; ECRCO's preliminary recommendations; NC DEQ's non-discrimination program; and the potential for informal resolution of this Complaint.

I will be contacting you in the next day or so to schedule a meeting to occur in the next two weeks. It is our goal to be able to reach informal resolution as soon as possible. We believe that through productive conversations over the next 60 days, we can negotiate an Informal Resolution Agreement that would address the concerns discussed in this letter and that would include a plan for moving forward on the above recommendations. If after discussion with NC DEQ, ECRCO does not believe informal resolution is possible, ECRCO will move forward to conclude its

investigation and issue formal findings. If you have any questions, please feel free to contact me at (202) 564-9649, by e-mail at dorka.lilian@epa.gov, or U.S. mail at U.S. EPA, Office of General Counsel, External Civil Rights Compliance Office (Mail Code 2310A), 1200 Pennsylvania Avenue, N.W., Washington, D.C., 20460.

Sincerely,

Lilian S. Dorka
Director
External Civil Rights Compliance Office
Office of General Counsel

Cc:

Elise B. Packard
Associate General Counsel for Civil Rights and Finance
U.S. EPA Office of General Counsel

Kenneth Lapierrre
Assistant Regional Administrator
U.S. EPA Region 4

Attachments

ATTACHMENT A

1. Wing, Steve, et al., *Environmental Injustice in North Carolina's Hog Industry*, 108 Envtl. Health Perspectives 225 (2000)
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ATTACHMENT B

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ATTACHMENT C

CHECK LIST FOR PROCEDURAL SAFEGUARDS FOR RECIPIENTS FEDERAL NON-DISCRIMINATION OBLIGATIONS

Federal Non-Discrimination Statutes: Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, the Age Discrimination Act of 1975, Section 13 of Federal Water Pollution Control Act of 1972, and Title IX of the Education Amendments of 1972.[20]

Item	Yes & Supporting Documentation	Not Yet	Checking
Notice of Non-Discrimination under the Federal Non-Discrimination Statutes[21]			
See attachment for recommended text of notice			
The non-discrimination notice is posted:			
• in a prominent location in your offices and facilities			
• prominently on your website			
• in any publications			
Grievance Procedures for Complaints filed under the Federal Non-Discrimination Statutes[22]			
A grievance procedure that:			
• Clearly identifies the Non-Discrimination Coordinator, including contact information			
• Explains the role of the Non-Discrimination Coordinator relative to the coordination and oversight of the grievance procedures			
• States who may file a complaint under the procedures			
• Describes which formal and informal processes are available, and the options for complainants in pursuing either			

[20] 40 C.F.R. § 7.85(g)
[21] 40 C.F.R. § 7.95(a).
[22] 40 C.F.R. § 7.90.

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Item	Yes & Supporting Documentation	Not Yet	Checking
• Explains that an appropriate, prompt and impartial investigation of any allegations filed under federal non-discrimination statutes will be conducted			
• States that the preponderance of the evidence standards will be applied during the analysis of the complaint			
• Contains assurances that retaliation is prohibited[23] and that claims of retaliation will be handled promptly if it occurs			
• States that written notice will be promptly provided about the outcome of the investigation, including whether discrimination is found and the description of the investigation process[24]			
• Is published in print in general publications distributed to the public			
Non-Discrimination Coordinator[25]			
At least one Non-Discrimination Coordinator to ensure compliance with the federal non-discrimination statutes			
Non-Discrimination Coordinator or other individual responsible for:			
• Providing information internally and externally regarding rights to services, aids, benefits, and participation without regard to race, national origin, color, sex, disability, age or prior opposition to discrimination			
• Providing notice of your Agency's formal and informal grievance processes and the ability to file a discrimination complaint			
• Establishing grievance policies and procedures or mechanisms (e.g., an investigation manual)			
• Tracking all complaints filed with your Agency under federal non-discrimination statutes including any patterns or systemic problems			

[23] 40 C.F.R. § 7.100.

[24] Whether OCR considers complaint investigations and resolutions to be "prompt" will vary depending on the complexity of the investigation and the severity and extent of the alleged discrimination. For example, the investigation and resolution of a complaint involving multiple allegations and multiple complainants likely would take longer than one involving a single allegation of discrimination and a single complainant.

[25] 40 C.F.R. § 7.85(g).

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Item	Yes & Supporting Documentation	Not Yet	Checking
• Semiannual reviews of all complaints filed with your Agency under federal non-discrimination statutes in order to identify and address any patterns or systemic problems			
• Appropriate training for your Agency's employees on your Agency's non-discrimination policies and procedures and obligations to comply with federal non-discrimination statutes			
• Updating complainants on the progress of their complaints filed with your Agency under federal non-discrimination statutes and any determinations made			
• Periodic evaluations of the efficacy of your Agency's efforts to provide services, aids, benefits, and participation in any of your Agency's programs or activities without regard to race, national origin, color, sex, disability, age or prior opposition to discrimination			
Public Participation			
Written and published public participation process/procedures that provide that when your Agency prepares a public participation plan for a specific action, it will include:			
• A description of the community (including demographics, history, and background)			
• A contact list of Agency officials with phone numbers and email addresses to allow the public to communicate via phone or internet			
• A list of past and present community concerns (including any complaints filed under the federal non-discrimination statutes)			
• A detailed plan of action (outreach activities) your Agency will take to address concerns			
• A contingency plan for unexpected events			
• Location(s) where public meetings will be held (consider the availability and schedules of public transportation			

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Item	Yes & Supporting Documentation	Not Yet	Checking
• Contact names for obtaining language assistance services for limited-English proficient persons, including, translation of documents and/or interpreters for meetings			
• Appropriate local media contacts (based on the culture and linguistic needs of the community			
• Location of the information repository			
Access To Programs And Activities by Persons with Limited English Proficiency			
Has your Agency conducted an appropriate analysis described in OCR's LEP Guidance found at 69 FR 35602 (June 25, 2004) and http://www.lep.gov to determine what language services it may need to provide to ensure that individuals with limited-English proficiency can meaningfully participate in the process?			
Has your Agency developed a language access plan consistent with the details found in OCR's training module for LEP. http://www.epa.gov/civilrights/lepaccess.htm?			
Does your Agency have written and published procedures that:			
• Ensure meaningful access to all of your Agency's programs and activities to persons with limited-English proficiency and individuals with disabilities			
• Make communities you serve aware that foreign language services are available			
• Translate standardized documents			
• Provide for simultaneous oral interpretation of live proceedings such as town hall meetings or public hearings			
Access To Programs And Activities by Persons with Disabilities			
Does your Agency have written and published procedures to ensure to provide access to your programs, services, and activities for individuals with disabilities that:			
• Provides at no cost appropriate auxiliary aids and services including, for example, qualified interpreters to individuals who are deaf or			

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Item	Yes & Supporting Documentation	Not Yet	Checking
hard of hearing, and to other individuals as necessary to ensure effective communication or an equal opportunity to participate fully in the benefits, activities, programs and services provided by your Agency in a timely manner and in such a way as to protect the privacy and independence of the individual			
• Ensures that your Agency's facilities and non-Agency facilities utilized by your Agency (*e.g.*, if your Agency holds a public hearing at a school) are physically accessible for individuals with disabilities			
• Makes communities you serve aware that services for individuals with disabilities are available			

NOTICE OF NON-DISCRIMINATION RECOMMENDED TEXT

[Agency Name] does not discriminate on the basis of race, color, national origin, disability, age, or sex in the administration of its programs or activities, as required by applicable laws and regulations.

[Insert name and title of Non-Discrimination Coordinator] is responsible for coordination of compliance efforts and receipt of inquiries concerning non-discrimination requirements implemented by 40 C.F.R. Part 7 (Non-discrimination in Programs or Activities Receiving Federal Assistance from the Environmental Protection Agency), including Title VI of the Civil Rights Act of 1964, as amended; Section 504 of the Rehabilitation Act of 1973; the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and Section 13 of the Federal Water Pollution Control Act Amendments of 1972.

If you have any questions about this notice or any of [Agency Name]'s non-discrimination programs, policies or procedures, you may contact:

[Insert name and title of Non-Discrimination Coordinator]
[Insert Agency Name and Address]
[Insert phone number of Non-Discrimination Coordinator]
[Insert email address of Non-Discrimination Coordinator]

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If you believe that you have been discriminated against with respect to a [Agency Name] program or activity, you may contact the [insert title of Non-Discrimination Coordinator] identified above or visit our website at [insert] to learn how and where to file a complaint of discrimination.

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Office of Civil Rights
REACH Complaint Meeting
January 12, 2017 · 3 p.m. – 4 p.m.
WJC North Conference Room 2528

Conference Number Ex. 6 - Personal Privacy

Agenda

1. Status of the letter -Mary
2. Complainants Request for conference call on status of complaint
3. Status of demographic analysis - Jeryl/Ravi
4. Status of desk statement/Background Paper with Q&A- Dan/Ericka
5. Brief discussion of anticipated needs in response to public inquiries/FOIAs (e.g., identification of our press spokespersons, identification of universe of documents and record holders)
6. Ex. 5 - Deliberative Process

Notes

- _____
- _____
- _____

Title VI and NC DEQ Swine CAFOs (REACH) Case
October 17, 2016

Agenda

1. Introduction/Brief Background on Case and Issues Accepted for Investigation

2. Path Forward/Approach on the REACH Case

3. Non-Health Impacts

4. Health Impacts

5. Potential EPA Options Outside of the REACH Case

Title VI and NC DEQ Swine CAFOs (REACH) Case
October 17, 2016

ATTACHMENT C

Studies and reports submitted as exhibits to or cited in the Complaint; cited in the disparate impact analysis submitted as an exhibit to the Complaint; or cited Earthjustice 2013 comments on draft Swine Permit.

"*" indicates apparent NC focus.

* Wing, Steve & Johnston, Jill, Dep't of Epidemiology, Univ. of N.C. at Chapel Hill, *Industrial Hog Operations in North Carolina Disproportionately Impact People of Color* (2014) **(Exhibit 4)**

* Wing, Steve & Johnston, Jill, Dep't of Epidemiology, Univ. of N.C. at Chapel Hill, *Industrial Hog Operations in North Carolina Disproportionately Impact People of Color* (2015) **(update of Exhibit 4)**

*Wing, Steve et al., *Environmental Injustice in North Carolina's Hog Industry*, 108 Envtl. Health Perspectives 225, 228 (2000), **(Exhibit 52)**. (finding that North Carolina's intensive hog confinement operations are located disproportionately in communities with higher levels of poverty, higher proportions of non-white persons, and higher dependence on wells for household water supply).

* Edwards, B. & Ladd, AE, *Race, Poverty, Political Capacity and the Spatial Distribution of Swine Waste in North Carolina*, 1982–1997, 9 North Carolina Geogr 55–77 (2001).

* Stretesky, Paul B. et al., *Environmental Inequity: An Analysis of Large-Scale Hog Operations in 17 States, 1982-1997*, 68 Rural Soc. 231 (2003) (finding that between 1982 and 1997 large-scale hog operations in North Carolina were more likely to be sited in areas with a disproportionate number of black residents).

Odors

*Wing S, Horton RA, Marshall SW, Thu K, Tajik M, Schinasi L, et al. 2008. *Air Pollution and Odor in Communities Near Industrial Swine Operations*. Environ. Health Perspect. 116:1362-1368. (For approximately 2 weeks, 101 nonsmoking adult volunteers living near industrial swine operations in 16 neighborhoods in eastern North Carolina sat outdoors for 10 min twice daily at preselected times. Participants reported 1,655 episodes of swine odor. In nine neighborhoods, odor was reported on more than half of study-days. The study indicates malodor from swine operations is commonly present in these communities and that the odors reported by neighbors are related to objective environmental measurements and interruption of activities of daily life.)

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* Schiffman Susan S. et al., *Quantification of Odors and Odorants from Swine Operations in North Carolina*, 108 Agric. & Forest Meteorology 213 (2001). (neighbors of confinement facilities experienced increased levels of mood disorders including anxiety, depression, and sleep disturbances attributable to exposures to malodorous compounds.)

*Avery, Rachel Horton et al., *Malodor as a Trigger of Stress and Negative Mood in Neighbors of Industrial Hog Operations*, 99 Am. J. Pub. Health Suppl., S610 (2009). (Hog odor, hydrogen sulfide, and semivolatile PM_{10} are related to stress and negative mood in disproportionately low-income communities near industrial hog operations in eastern North Carolina. Malodor should be considered in studies of health impacts of environmental injustice.)

*Schiffman SS, Sattely Miller EA, Suggs MS, Graham BG. 1995. *The Effect of Environmental Odors Emanating from Commercial Swine Operations on the Mood of Nearby Residents*. Brain Research Bulletin 17:369-375. (neighbors of confinement facilities experienced increased levels of mood disorders including anxiety, depression, and sleep disturbances attributable to exposures to malodorous compounds.)

*Tajik M, Muhammad N, Lowman A, Thu K, Wing S, Grant G. 2008. *Impact of Odor from Industrial Hog Operations on Daily Living Activities.* New Solutions 18:193-205. (75 participants in eastern North Carolina in 2002 and again in 2004 and 2005. Indicates that hog odor limits several leisure time activities and social interactions which could have adverse public health consequences.)

* Avery, Rachel et al., *Odor from Industrial Hog Farming Operations and Mucosal Immune Function in Neighbors*, 59(2) Archives of Envtl. Health 101 (2004) (finding that swine odor was associated with reduced mucosal immune function among 15 adults living near industrial swine operations in North Carolina).

Air

* Deerhake, Marion et al., *Atmospheric Dispersion and Deposition of Ammonia Gas*, *in* RTI Int'l, Benefits of Adopting Environmentally Superior Swine Waste Management Technologies in North Carolina: An Environmental and Economic Assessment, at 2-32 to 2-34 (2003), *available at* http://www.cals.ncsu.edu/waste_mgt/smithfield_projects/phase1report04/appendix%20c-RTI.pdf, **(Exhibit 47)** (modeling rates of ammonia deposition by county). "The greatest deposition occurs in Sampson and Duplin counties." *Id.* at 2-33.

* Mirabelli, Maria C. et al., *Asthma Symptoms Among Adolescents Who Attend Public Schools That Are Located Near Confined Swine Feeding Operations*, 118 Pediatrics e66 (2006) **(Exhibit 42)** (finding students aged 12 to 14 who attended North Carolina public schools within 3 miles of industrial swine facilities reported increased asthma-related symptoms, more doctor-diagnosed asthma, and more asthma-related medical visits compared to peers at other schools).

* Mirabelli, Maria C. et al., *Race, Poverty, and Potential Exposure of Middle-School Students to Air Emissions from Confined Swine Feeding Operations*, 114 Envtl. Health Perspectives 591, 595 (2006) **(Exhibit 43)** (finding that North Carolina's swine facilities are located closer to schools enrolling higher percentages of non-white and economically disadvantaged students).

* Schinasi, Leah et al., *Air Pollution, Lung Function, and Physical Symptoms in Communities Near Concentrated Swine Feeding Operations*, 22 Epidemiology 208, 208 (2011), **(Exhibit 48)** (measuring pollutants levels and effect on 101 adults living near hog CAFOs in 16 eastern North Carolina communities).

*Sacoby, M. Wilson & Serre, Marc L., *Examination of Atmospheric Ammonia Levels Near Hog CAFOs, Homes, and Schools in Eastern North Carolina*, 41 Atmospheric Env't 4977, 4985 (2007), **(Exhibit 49)**. (NH_3 weekly average concentrations that were collected using passive diffusion tubes from October 2003 to May 2004 (20 sites) and from July 2004 to October 2004 (23 sites) near community locations in close proximity to hog CAFOs. The results indicate potential zones of exposure for human populations who live or go to school near hog CAFOs.)

*Steve Wing et al., *Air Pollution and Odor in Communities near Industrial Swine Operations*, 116 Envtl. Health Perspectives 1362 (2008), **(Exhibit 50)** (study participants living within 1.5 miles of swine factory farm reported altering or ceasing normal daily activities when hydrogen sulfide concentrations, and associated hog odor, were the highest).

* Wing, Steve et al., *Air Pollution from Industrial Swine Operations and Blood Pressure of Neighboring Residents*, 121 Envtl. Health Perspectives 92 (2013) **(Exhibit 51)**. (Like noise and other repetitive environmental stressors, malodors may be associated with acute blood pressure increases that could contribute to development of chronic hypertension.)

Vanotti, Matias B. & Patrick G. Hunt, Ammonia Removal from Swine Wastewater Using Immobilized Nitrifiers, *in* Proceedings of the 8th Int'l. Conf. of the FAO ESCORENA Network on Recycling of Agricultural, Municipal and Industrial Residues in Agriculture, Rennes, France 427, 428 (1998), *available at* http://www.ramiran.net/doc98/FIN-ORAL/VANOTTI.pdf.

Zahn, James A. et al., *Air Pollution from Swine Production Facilities Differing in Waste Management Practice* 3, Proceedings of the Odors and Emission 2000 Conference (2000) (listing all types of "emissions released from stored swine manure" mentioned above).

Merchant, James A. et al., *Asthma and Farm Exposures in a Cohort of Rural Iowa Children*, 113 Envtl. Health Perspectives 350 (2005) (finding children living on swine farms, including large facilities with more than 500 head, experienced increased rates of asthma compared to non-exposed children; results more pronounced where swine facilities added antibiotics to feed).

Radon, Katja et_al., *Environmental Exposure to Confined Animal Feeding Operations and Respiratory Health of Neighboring Residents*,18 Epidemiology 300 (2007) (surveying nearly

7,000 residents of four German towns with high confined livestock operation densities and concluding that such operations "may contribute to the burden of respiratory disease among their neighbors"). (Footnoted in Earthjustice comments on draft permit).

* Walker, John T. et al., *Atmospheric Transport and Wet Deposition of Ammonium in North Carolina*, 34 Atmospheric Env't 3,407 (2000). (NH_3 emissions from this source region, primarily evolving from swine and poultry operations, are found to increase NH_4^+ concentration in precipitation at sites up to ≈80 km away. At the Scotland County (NC36) and Wake County (NC41) sites, mean NH_4^+ concentrations show increases of at least 44% for weeks during which 25% or more back trajectories are influenced by this source region.)

*Costanza, Jennifer K et al., *Potential Geographic Distribution of Atmospheric Nitrogen Deposition from Intensive Livestock Production in North Carolina, USA*, 398 Sci. Total Env't 76, 77 (2008).

* Schiffman, Susan S. et al., *Symptomatic Effects of Exposure to Diluted Air Sampled from a Swine Confinement Atmosphere on Healthy Human Subjects*, 113 Envtl. Health Perspectives 567 (2005) (finding that those exposed to diluted swine air for two 1-hour sessions were more likely to report headaches, eye irritation, and nausea than the control group that was exposed to clean air); [HYPERLINK "http://www.ncbi.nlm.nih.gov/pubmed/15866765"]. (Aerial emissions from a swine house at North Carolina State University's field laboratory were diluted to a level that could occur at varying distances downwind from a confined animal feeding operation (CAFO) both within and beyond the property line, and these emissions were delivered to an environmental exposure chamber.)

*Sacoby, M. Wilson & Serre, Marc L. *Use of Passive Samplers to Measure Atmospheric Ammonia Levels in a High-density Industrial Hog Farm Area of Eastern North Carolina*, 41 Atmospheric Env't 6,074 (2007). (October 2003 to May 2004 (20 sites) and from July 2004 to October 2004 (23 sites) at varying distances from hog CAFOs in close proximity to homes and schools. Average weekly NH3 levels were measured. Mean level of 13.8 ppb near homes and schools (<2 km) was 4–12 times greater than ambient background levels (1–3 ppb), reaching as high as 80 ppb. Exposed sites (<2 km from a hog CAFO) had a mean level of 12.8 ppb which was over 2 times higher than the mean level of 5.5 ppb at less exposed sites (>2 km from a hog CAFO).)

Donham K. 1993. *Respiratory Disease Hazards to Workers in Livestock and Poultry Confinement Structures*. Seminars in Respiratory Medicine 14:49-59.

Donham K, Reynolds S, Whitten P, Merchant J, Burmeister L, Popendorf W. 1995. *Respiratory Dysfunction in Swine Production Facility Workers: Dose-response Relationships of Environmental Exposures and Pulmonary Function*. American Journal of Industrial Medicine 27:405-418.

Donham K, Cumro D, Reynolds S, Merchant J. 2000. *Dose-Response Relationships Between Occupational Aerosol Exposures and Cross-Shift Declines of Lung Function in Poultry Workers: Recommendations for Exposure Limits*. Journal of Occupational and Environmental Medicine 42:260-269.

Donham, KJ. 1990. *Health Effects from Work in Swine Confinement Buildings*. American Journal of Industrial Medicine 17:17-25.

Water

* Anderson, M.E. & Sobsey, M.D. *Detection and Occurrence of Antimicrobially Resistant* E. coli *in Groundwater on or near Swine Farms in Eastern North Carolina*, 54 Water Sci. & Tech. 211, 217 (2006), **(Exhibit 37)** ("Overall, the results of this study demonstrated that antibiotic-resistant E. coli were present in ground waters associated with commercial swine farms that have anaerobic lagoons and land application systems for swine waste management.").

*Wendee, Nicole, *CAFOs and Environmental Justice: The Case of North Carolina*, 121 Envtl. Health Perspectives A182, A186 (2013), **(Exhibit 44)** ("Even without spills, ammonia and nitrates may seep into groundwater, especially in the coastal plain where the water table is near the surface.").

* Burkholder, JoAnn M. et al., *Impacts of Waste from CAFOs on Water Quality*, 115 Envtl. Health Perspectives 308, 309 (2007) **(Exhibit 3** Ex. 6 - Personal Privacy **Declaration).** (article is part of the mini-monograph "Environmental Health Impacts of Concentrated Animal Feeding Operations: Anticipating Hazards—Searching for Solutions.")

* Mallin, Michael A. et al., Ctr. for Marine Science Research, Univ. of N.C. at Wilmington, Effect of Organic and Inorganic Nutrient Loading on Photosynthetic and Heterotrophic Plankton Communities in Blackwater Rivers (1998), *available at* http://repository.lib.ncsu.edu/dr/bitstream/1840.4/1880/1/NC-WRRI-315.pdf;

Hodne, Carol J., Iowa Policy Project, Concentrating on Clean Water: The Challenge of Concentrated Animal Feeding Operations 8 (2005), *available at* http://www.iowapolicyproject.org/2005docs/050406-cafo-fullx.pdf. 2005docs/050406-cafo-fullx.pdf (identifying "seepage from earthen manure storage structures" as typical pathway for nitrates entering groundwater).

* Burkholder, JoAnn M. & Glasgow, Howard B. *History of Toxic Pfiesteria in North Carolina Estuaries from 1991 to the Present*, 51 Biosci. 827, 833 (2001) ("During acute [Pfiesteria] exposure, fish commonly hemorrhage or develop skin lesions that are diffuse or nonfocal, as well as deep, localized or focal, bleeding sores or ulcerations.").

* Mallin, Michael A. et al., *Factors Contributing to Hypoxia in Rivers, Lakes, and Streams*, 51 Limnology & Oceanography 690, 699-700 (2006). (Investigated physical, chemical, and biological variables contributing to biochemical oxygen demand (BOD)

in 17 North Carolina lotic and lentic water bodies affected by mild to severe hypoxia.)

* Wing, Steve et al., *The Potential Impact of Flooding on Confined Animal Feeding Operations in Eastern North Carolina*, 110 Envtl. Health Perspectives 387, 387 (2002), *available at* http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240801/pdf/ehp0110-000387.pdf (describing how the 15-20 inches of rain dropped by Hurricane Floyd turned eastern North Carolina into a fecal flood zone). The flooding following Hurricane Floyd was not an isolated incident. *Id.* ("In 1996, 22 fecal waste pits were reported to have been ruptured or inundated following flooding from Hurricane Fran, and one major spill was reported following Hurricane Bonnie in 1998.").

* Casteel et al,, "*Fecal Contamination of Agricultural Soils Before And After Hurricane-Associated Flooding In North Carolina*," J Environ Sci Health A Tox Hazard Subst Envìron Eng 41, no,2 (2006).

Ham, J.M. & Baum, K.A. *Measuring Seepage from Waste Lagoons and Earthen Basins with an Overnight Water Balance Test*, 52 Am. Soc'y of Agric. And Biological Engineers 835 (2009) (introducing test capable of producing accurate seepage measurements in single overnight performance).

Ham, J.M. *Seepage losses from animal waste lagoons: A summary of a four year investigation in Kansas*, 45 Am. Soc'y of Agric. Eng'rs 983 (2002) (summarizing study performed using earlier variation of water balance method).

Antibiotic Resistance

Casey, Joan A. *High-Density Livestock Operations, Crop Field Application of Manure, and Risk of Community-Associated Methicillin-Resistant* Staphylococcus aureus *Infection in Pennsylvania*, 173 J. Am. Med Ass'n: Internal Med. 1980 (2013).

Ctrs. for Disease Control, U.S. Dep't of Health and Human Servs., Antibiotic Resistance Threats in the United States, 2013, at 6 (2013), *available at* http://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf.

Denis, Oliver et al., *Methicillin-Resistant* Staphylococcus aureus *ST398 in Swine Farm Personnel, Belgium*, 15 Emerging Infectious Diseases 1098 (2009) (Belgium).

Huijsdens, Xander W. et al., *Community-Acquired MRSA and Pig-Farming*, 5 Annals Clinical Microbiol. & Antimicrobials 26 (2006) (Netherlands).

Khanna, T. et al., *Methicillin Resistant* Staphylococcus aureus *Colonization in Pigs and Pig Farmers*, 128 J. Veterinary Microbiol. 298 (2008) (Canada).

* Rinsky JL, Nadimpalli M, Wing S, Hall D, Baron D, Price LB, et al. 2013. *Livestock-Associated Methicillin and Multidrug Resistant* Staphylococcus Aureus *Is Present Among*

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Industrial, Not Antibiotic-Free Livestock Operation Workers in North Carolina. PloS One 8:e67641.

Schulz, Jochen et al., *Longitudinal Study of the Contamination of Air and of Soil Surfaces in the Vicinity of Pig Barns by Livestock-Associated Methicillin-Resistant* Staphylococcus aureus, 78 Applied Envtl. Microbiol. 5666 (2012) (detecting MRSA 300 feet from a barn in which animals, air, and workers' plastic boots tested positive for MRSA).

Silbergeld, EK & Price LB, *Industrial Food Animal Production, Antimicrobial Resistance, and Human Health*, 29 Ann. Rev. of Pub. Health 151 (2008).

Silbergeld, E.K., et al., *One Reservoir: Redefining the Comrnunity Origins of Antimicrobial-Resistant Infections,* Med Clin North Am 92, no. 6 (2008).

Smith, Tara C., et al., *Methicillin-Resistant* Staphylococcus auereus *(MRSA) Strain ST398 Is Present in Midwestern U.S. Swine and Swine Workers*, 4 PLoS One e4258 (2009).

Smith, Tara C., et al., *Methicillin-Resistant* Staphylococcus aureus *in Pigs and Farm Workers on Conventional and Antibiotic-Free Swine Farms in the USA*, 8 PLoS One e63704 (2013).

Van den Broek, Ingrid V.F. et al., *Methicillin-Resistant* Staphylococcus aureus *in People Living and Working in Pig Farms*, 137 J. Epidem. & Infection 700 (2009) (Netherlands).

West, Bridgett M., et al., *Antibiotic Resistance, Gene Transfer, and Water Quality Patterns Observed in Waterways Near CAFO Farms and Wastewater Treatment Facilities*, 217 Water Air Soil Pollution 473 (2011).

Barrett, Julia R., *Airborne Bacteria in CAFOs: Transfer of Resistance from Animals to Humans*, 113 Envtl. Health Perspectives A116 (2005) (reviewing literature on cross-species transfer of antibiotic-resistant bacteria).

Chapin, Amy, et al., *Airborne Multidrug-Resistant Bacteria Isolated from a Concentrated Swine Feeding Operation*, 113 Envtl. Health Perspectives 137 (2005) (finding multidrug-resistant *Enterococcus*, coagulase-negative staphylococci, and viridans group streptococci in the air of an industrial swine operation at levels dangerous to human health).

Gibbs, Shawn G. et al., *Isolation of Antibiotic-Resistant Bacteria from the Air Plume Downwind of a Swine Confined or Concentrated Animal Feeding Operation*, 114 Envtl. Health Perspectives 1032 (2006).

Gibbs, Shawn G. et al., *Airborne Antibiotic Resistant and Nonresistant Bacteria and Fungi Recovered from Two Swine Herd Confined Animal Feeding Operations*, 1 J. Occupational & Envtl. Hygiene 699 (2004) (finding multidrug-resistant bacteria inside and downwind of

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industrial swine operations at levels previously determined to pose a human health hazard). (midwest CAFOs)

Casey JA, Curriero FC, Cosgrove SE, Nachman KE, Schwartz BS. 2013. *High-Density Livestock Operations, Crop Field Application of Manure, and Risk of Community-Associated Methicillin-Resistant Staphylococcus Aureus Infection in Pennsylvania*. JAMA Internal Medicine 173:1980-1990.

*Cole, D, Drum DJ, Stalknecht DE, White DG, Lee MD, Ayers S, et al. 2005. *Free-living Canada Geese and Antimicrobial Resistance*. Emerging Infectious Diseases 11:935-938. (Describes antimicrobial resistance among *Escherichia coli* isolated from free-living Canada Geese in Georgia and North Carolina (USA). Resistance patterns are compared to those reported by the National Antimicrobial Resistance Monitoring System. Canada Geese may be vectors of antimicrobial resistance and resistance genes in agricultural environments.)

Graham JP, Price LB, Evans SL, Graczyk TK, Silbergeld EK. 2009. *Antibiotic Resistant Enterococci and Staphylococci Isolated from Flies Collected near Confined Poultry Feeding Operations*. Sci Total Environ 407:2701-10. (Delmarva Peninsula)

*Rinsky JL, Nadimpalli M, Wing S, Hall D, Baron D, Price LB, et al. 2013. *Livestock-Associated Methicillin and Multidrug Resistant Staphylococcus Aureus Is Present Among Industrial, Not Antibiotic-Free Livestock Operation Workers in North Carolina*. PloS One 8:e67641.

van de Giessen AW, van Santen-Verheuvel MG, Hengeveld PD, Bosch T, Broens EM, Reusken CB. 2009. *Occurrence of Methicillin-Resistant Staphylococcus Aureus in Rats Living on Pig Farms*. Preventive Veterinary Medicine 91:270-273. (Netherlands)

Green CF, Gibbs SG, Tarwater PM, Mota LC, Scarpino PV. 2006. *Bacterial Plume Emanating from the Air Surrounding Swine Confinement Operations*. Journal of Occupational and Environmental Hygiene 3:9-15. (midwest CAFOs)

Property Values

* Kim, Jungik & Goldsmith, Peter, *A Spatial Hedonic Approach to Assess the Impact of Swine Production on Residential Property Values*, 42 Envtl & Res. Econ. 509 (2009) (estimating decline in Craven County, NC home property values on per hog basis).

* Milla, Katherine, et al., *Evaluating the Effect of Proximity to Hog Farms on Residential Property Values: A GIS-Based Hedonic Model Approach*, 17 URISA J. 27 (2005) (finding that values of Craven County, North Carolina homes decreased with increasing local hog populations and decreasing distances from homes to factory farms).

*Palmquist RB, Roka FM, Vukina T (1997) *Hog Operations, Environmental Effects, and Residential Property Values.* Land Econ 73:114–124 (find that hog operations in North Carolina

cause a reduction in house price up to 9% depending on the number of hogs and their distance from the house. They estimate that the effect of a new hog operation located within one-half mile of a house would decrease the house value by 4.75% if a house is exposed to an intermediate level of manure.)

Herriges JA, Secchi S, Babcock BA, *Living with Hogs in Iowa: The Impact of Livestock Facilities on Rural Residential Property Values*, 81 Land Econ. 530 (2005). (found that a moderate-size livestock operation (250,000 live weight pounds) can cause −26% reduction in property value in Iowa if the property is downwind and ¼ mile away from the facility.)

Surveys/Quality of Life/Public Health Impacts

*Bullers S. *Environmental Stressors, Perceived Control, and Health: The Case of Residents Near Large-Scale Hog Farms in Eastern North Carolina*. Human Ecology 33:1-16. (2005) (physical and psychological health effects of residence near industrial hog farms)

Cole, Dana et al., *Concentrated Swine Feeding Operations and Public Health: A Review of Occupational and Community Health Effects*, 108 Envtl. Health Perspectives 685 (2000), *available at* http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1638284/pdf/envhper00309-0041.pdf, **(Exhibit 39).**

Thu, K.M., *Public Health Concerns for Neighbors of Large-Scale Swine Production Operations*, 8 J. Agric. Safety & Health 175 (2002) (synthesizing research regarding public health concerns for neighbors of industrial swine facilities, including respiratory issues associated with air pollution).

Hribar, Carrie, Nat'l Ass'n of Local Bds. of Health, *Understanding Concentrated Animal Feeding Operations and Their Impact on Communities, Environmental Health* 4 (2010), *available at* http://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf, (**Exhibit 40)**.

Pew Commission on Industrial Farm Animal Production, *Environmental Impact of Industrial Farm Animal Production* 1-2 (2008), *available at* http://www.ncifap.org/_images/212-4_EnvImpact_tc_Final.pdf, (**Exhibit 45).**

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Gurian-Sherman, Doug, Union of Concerned Scientists, *CAFOs Uncovered: The Untold Costs of Confined Animal Feeding Operations* (2008), *available at* http://www.ucsusa.org/assets/documents/food_and_agriculture/cafos-uncovered.pdf (discussing the substantial cost of confined animal feeding operations and discussing alternatives).

Greger, Michael & Koneswaran, Gowri, *The Public Health Impacts of Concentrated Animal Feeding Operations on Local Communities*, 33 Farm Cmty. Health 11, 13 (2010).

Stacy Sneeringer, *Does Animal Feeding Operation Pollution Hurt Public Health? A National Longitudinal Study of Health Externalities Identified by Geographic Shifts in Livestock Production*, 91 Am. J. Agric. Econ. 124, 130 (2009). (Using county-level data spanning two decades. 100,000 animal unit increase in a county corresponds to 123 more deaths of infants under one year per 100,000 births and 100 more deaths of infants under 28 days per 100,000 births. Doubling of production induces a 7.4% increase in infant mortality. Mortality increases are driven by elevated levels of respiratory diseases, providing suggestive evidence of an air pollution mechanism.)

Donham KJ, et al. *Community Health and Socioeconomic Issues Surrounding Concentrated Animal Feeding Operations*. Environ. Health Perspect. 115:317-320 (2007) (survey of literature on effects on physical health, mental health, social health, economic health)

Thu K, Donham K, Ziegenhorn R, Reynolds S, Thorne P, Subramanian P, et al. 1997. *A Control Study of the Physical and Mental Health of Residents Living near a Large-Scale Swine Operation*. Journal of Agricultural Safety and Health 3:13-26.

Thorne, P. S., *Environmental Health Impacts of Concentrated Animal Feeding Operations Anticipating Hazards-Searching for Solutions,* Environ Health Perspect 115, ro.2 (2007). (Describes 5 expert workgroup reports from 2004 scientific conference that outline the state of the science and public health concerns relating to major environmental health issues associated with CAFOs CAFO livestock production including respiratory health effects, modeling and monitoring of air toxics, water quality issues, influenza pandemics and antibiotic resistance, and community health and socioeconomic issues.)

Villeneuve, P. J. et al., *Intensive Hog Farming Operations and Self-Reported Health Among Nearby Rural Residents in Ottawa, Canada*, BMC Public Health 9(2009) (Higher prevalence of depression among those who lived within 3 km of the swine CAFO relative to those who lived more than 9 km away. Individuals who lived closer to the swine CAFO were more likely to worry about environmental issues such as water quality, outdoor and indoor smells, and air pollution which contributed to lower HRQOL scores for individuals who lived closer to swine CAFO. Prevalence of depression was much higher among those who indicated a concern about environmental issues (18.2%) when compared to those who did not (8.0%).)

Rule, A. M., et. al., *Food Animal Transport: A Potential Source of Community Exposures to Health Hazards from Industrial Farming (CAFOs),* J Infect & Pub Health, 1:33-39, (2008). (Air and surface samples were taken from cars driving behind poultry trucks for 17 miles. Air conditioners and fans were turned off and windows fully opened. Results indicate an increase in the number of total aerobic bacteria including both susceptible and drug-resistant enterococci isolated from air and surface samples, and suggest that food animal transport in open crates

introduces a novel route of exposure to harmful microorganisms and may disseminate these pathogens into the general environment.)

Other

Wing S. *Social Responsibility and Research Ethics in Community-Driven Studies of Industrialized Hog Production. Environ*. Health Perspect. 110:437–444. (2002)

*Furuseth O. *Restructuring of Hog Farming in North Carolina: Explosion and Implosion*. Professional Geographer 49:391-403. (1997)

Rotz, C.A., *Management to Reduce Nitrogen Losses in Animal Production*, 82 J. Animal Sci. E119, E129 (2004).

Rule, Ana M. et al., *Assessment of an Aerosol Treatment To Improve Air Quality in a Swine Concentrated Animal Feeding Operation,* 39 Envtl. Sci. & Tech., 9649, 9649 (2005).

Thu K.. *Agriculture, the Environment, and Sources of State Ideology and Power*. Culture and Agriculture 23:1-7. (2001)

Thu K. *Industrial Agriculture, Democracy, and the Future. In: Beyond Factory Farming: Corporate Hog Barns and the Threat to Public Health, the Environment, and Rural Communities*, (Ervin A, Holtslander C, Qualman D, Sawa R, eds). Saskatoon, Saskatchewan:Canadian Centre for Policy Alternatives. (2003)

Other studies OCR has located:

Donham KJ1, Lee JA, Thu K, Reynolds SJ., *Assessment Of Air Quality At Neighbor Residences In The Vicinity Of Swine Production Facilities*., [HYPERLINK "http://www.ncbi.nlm.nih.gov/pubmed/19274894" \o "Journal of agromedicine."] 2006;11(3-4):15-24. doi: 10.1300/J096v11n03_03. [HYPERLINK "http://www.ncbi.nlm.nih.gov/pubmed/19274894"] (Air sampling was completed on the front lawn of 35 homes neighboring swine farms in Upper Midwest. In swine CAFO area, exceedences of federal recommended limits for hydrogen sulfide in outdoor air were observed in the swine CAFO area. Concentration of hydrogen sulfide exceeded the recommended limits of the ATSDR (30 ppb) for chronic exposure at two of the 12 homes in the CAFO area (17%). Average hydrogen sulfide concentration exceeded the EPA recommended community standards (0.7 ppb). As chronic exposure to hydrogen sulfide may be present in areas of production agriculture, a potential health risk may be present.)

Thorne PS, Ansley AC, Perry SS. *Concentrations of Bioaerosols, Odors, and Hydrogen Sulfide Inside and Downwind From Two Types of Swine Livestock Operations*. J Occup Environ Hyg. 2009 Apr;6(4):211-20. doi: 10.1080/15459620902729184 [HYPERLINK "http://www.ncbi.nlm.nih.gov/pubmed/19177273"] (Inhalable particulate matter, endotoxin, odor threshold, hydrogen sulfide, culturable mesophilic bacteria, culturable fungi, and total airborne microbes, along with wind speed, temperature, and humidity were measured at separate midsized livestock facilities (one hoop, one confinement) in Central Iowa on 10 occasions over 2 years.

Significant differences in contaminants were observed between hoops and confinement buildings and across seasons for endotoxin, odors, airborne microorganisms, and hydrogen sulfide. Both types of swine operations produced high airborne concentrations of endotoxin, odor, hydrogen sulfide, bacteria, and fungi. Endotoxin and odors were found downwind at concentrations previously associated with adverse health effects)

*Heaney, Christopher D., et al., *Source Tracking Swine Fecal Waste in Surface Water Proximal To Swine Concentrated Animal Feeding Operations*, Science of the Total Environment 511 (2015) 676-683.

Abstract: For one year, surface water samples at up- and downstream sites proximal to swine CAFO lagoon waste land application sites were tested for fecal indicator bacteria (fecal coliforms, Escherichia coli and Enterococcus) and candidate swine-specific microbial source-tracking (MST) markers (Bacteroidales Pig-1-Bac, Pig-2-Bac, and Pig-Bac-2, and methanogen P23-2). Testing of 187 samples showed high fecal indicator bacteria concentrations at both up- and downstream sites. Overall, 40%, 23%, and 61% of samples exceeded state and federal recreational water quality guidelines for fecal coliforms, E. coli, and Enterococcus, respectively. Pig-1-Bac and Pig-2-Bac showed the highest specificity to swine fecal wastes and were 2.47 (95% confidence interval [CI] = 1.03, 5.94) and 2.30 times (95% CI = 0.90, 5.88) as prevalent proximal down- than proximal upstream of swine CAFOs, respectively. Pig-1-Bac and Pig-2-Bac were also 2.87 (95% CI = 1.21, 6.80) and 3.36 (95% CI = 1.34, 8.41) times as prevalent when 48 hour antecedent rainfall was greater than versus less than the mean, respectively. Results suggest diffuse and overall poor sanitary quality of surface waters where swine CAFO density is high. Pig-1-Bac and Pig-2-Bac are useful for tracking off-site conveyance of swine fecal wastes into surface waters proximal to and downstream of swine CAFOs and during rain events.

*Michael A. Mallin & Matthew R. McIver & Anna R. Robuck & Amanda Kahn Dickens, *Industrial Swine and Poultry Production Causes Chronic Nutrient and Fecal Microbial Stream Pollution,* Water Air Soil Pollut (2015) 226: 407 (on 10 dates during 2013 investigated physical, chemical, and biological pollution of stream waters (Stocking Head Creek & Maxwell Creek, NC) permitted for collectively 108,068 swine & 1,312,500 broiler chickens in a watershed without industrial or municipal point sources of pollution, 67 dwellings yielding 0.03 septic systems/ha, and containing little traditional crop agriculture. Stocking Head Creek is highly polluted by fecal bacteria, by both measures of the NC criteria for impaired waters. Elevated fecal coliform counts occurred during both wet and dry periods indicating it is chronically polluted by fecal bacteria & did not significantly differ between rainy and dry periods, indicating that surface and groundwater pollution occurs independently of stormwater runoff.)

*Arfken, A.M., Mallin, M.A., Cahoon, L.B., Song, B. (2013). *Monitoring Swine Fecal Contamination in the Cape Fear River Watershed Based on the Detection and Quantification of Hog-Specific* Bacteroides-Prevotella *16S rRNA Genes.* Report No. 436. Water Resources Research Institute of the University of North Carolina.

*Michael A. Mallin, Mary Grace Lemon, Matthew R. McIver, *Environmental Quality Of Wilmington And New Hanover County Watersheds, 2013*, CMS Report 14-01, Center for Marine

Science University of North Carolina Wilmington, Wilmington, N.C. 28409 (May 2014) [HYPERLINK "http://www.uncw.edu/cms/aelab/"]

*Michael A. Mallin, Matthew R. McIver, Amanda Kahn Dickens and Anna R. Robuck, Center for Marine Sciences, *University of North Carolina Wilmington Chronic Stream Pollution in a CAFO Rich Watershed in Duplin County, NC* (2013) (in NC Studies folder)

*Harden, Stephen L., USGS Prepared in cooperation with the North Carolina Department of Environment and Natural Resources, Division of Water Resources, *Surface-Water Quality in Agricultural Watersheds of the North Carolina Coastal Plain Associated with Concentrated Animal Feeding Operations,* Scientific Investigations Report 2015–5080 (2015).

Abstract: The effects of concentrated animal feeding operations (CAFOs) on water quality were investigated at 54 agricultural stream sites throughout the North Carolina Coastal Plain during 2012 and 2013. Three general watershed land-use types were examined during the study, including 18 background watersheds with no active CAFOs (BK sites), 18 watersheds with one or more active swine CAFOs but no poultry CAFOs (SW sites), and 18 watersheds with at least one active swine CAFO and one active dry-litter poultry CAFO (SP sites). The watershed drainage areas for these 54 stream sites ranged from 1.2 to 17.5 square miles. Conventional fertilizers used for crop production are the primary source of nutrients at the BK sites. Animal-waste manures represent an additional source of nutrients at the SW and SP study sites. . . . When compared on the basis of land-use type, there was an overall measurable effect of CAFO waste manures on stream water quality for the SW and SP watershed groups. . . . On the basis of the results of this study, land applications of waste manure at swine CAFOs influenced ion and nutrient chemistry in many of the North Carolina Coastal Plain streams that were studied.

*Arun D. Shendrikar, Joette Steger, Hoke Kimball, Wayne Cornelius, Mark Yirka, Robert Bishop and Neil Joyner, *Ambient Atmospheric Ammonia Monitoring Around Hog Farm Industries in North Carolina* (date unknown – likely 2005 or 2006) (conducted by NC DEQ staff. Copy located in NC specific folder. In 1999, the Ambient Monitoring Section of Division of Air Quality (AMS-DAQ) started ammonia monitoring in the light of exponential growth of the regional hog farm industries. "There remains a merit to continue monitoring ammonia for the following reasons:
–It is a well documented fact (through open literature) that agricultural practices have affects on increased ammonia emissions into the environment.")

*Deanna L. Osmond, Dana L. K. Hoag, Al E. Luloff, Donald W. Meals and Kathy Neas, *Farmers' Use of Nutrient Management: Lessons from Watershed Case Studies*, Journal of Environmental Quality – Article, Vol. 44 No. 2, p. 382-390 (March 2015).
(Two case studies, one involving field surveys from three nutrient-impaired river basins/watersheds in North Carolina (Neuse, Tar-Pamlico, and Jordan Lake drainage areas). Results indicate farmers generally did not fully apply nutrient management plans or follow basic soil test recommendations even when they had them. Farmers were found to be hesitant to apply N at university-recommended rates because they did not trust the recommendations, viewed abundant N as insurance, or used recommendations made by fertilizer dealers. Exceptions were noted when watershed education, technical support, and funding resources focused on nutrient

management that included easing management demands, actively and consistently working directly with a small group of farmers, and providing significant resource allocations to fund agency personnel and cost-share funds to farmers. Without better dialogue with farmers and meaningful investment in strategies that reward farmers for taking what they perceive as risks relative to nutrient reduction, little progress in true adoption of nutrient management will be made.)

Travis Lee Kleinschmidt, *Modeling hydrogen sulfide emissions: are current swine animal feeding operation regulations effective at protecting against hydrogen sulfide exposure in Iowa?* Dissertation, Univ. of Iowa, 2011. (Models a large swine CAFO using the air quality dispersion model AERMOD and graphs the estimated concentration of hydrogen sulfide of vs. distance from the CAFO. Reading his graph the concentration of hydrogen sulfide at 3 miles is about half that at 2 miles.)

*Yelena Ogneva-Himmelberger *, Liyao Huang and Hao Xin, *CALPUFF and CAFOs: Air Pollution Modeling and Environmental Justice Analysis in the North Carolina Hog Industry,* ISPRS Int. J. Geo-Inf. 2015, 4, 150-171; doi:10.3390/ijgi4010150 (Published: 26 January 2015) (Uses air pollution dispersion model (CALPUFF) to estimate ammonia concentrations at locations downwind of hog CAFOs and to evaluate the disproportionate exposure of children, elderly, whites and minorities to the pollutant in one watershed in North Carolina and compare between 2000 and 2010. Results show that the average ammonia concentrations in hot spots for 2000 and 2010 were 2.5–3-times higher than the average concentration in the entire watershed.)

EPA, Office of Research and Development (ORD), Land Remediation and Pollution Control Division, National Risk Management Research Laboratory, *Detecting and Mitigating the Environmental Impact of Fecal Pathogens Originating from Confined Animal Feeding Operations: Review*, p.3, (2005).

*Ladd AE, Edward B. *Corporate Swine and Capitalist Pigs: A Decade of Environmental Injustice and Protest in North Carolina*. Soc Justice. 2002;29:26–46.

Centers for Disease Control and Prevention 1998. Public Health Issues Related to Concentrated Animal Feeding Operations. Workshop. Washington, DC: National Center for Environmental Health, Centers for Disease Control and Prevention. Available: [HYPERLINK "http://www.cdc.gov/cafos" \t "pmc_ext"] [accessed 26 September 2005].;

Donham KJ. The concentration of swine production. Effects on swine health, productivity, human, and the environment. Vet Clinics N Am Food Anim Prac. 2000;16(3):559–597. [[HYPERLINK "https://www.ncbi.nlm.nih.gov/pubmed/11084993" \t "pmc_ext"]];

National Academy of Sciences 2002. The scientific basis for estimating air emissions from animal feeding operations. Washington, DC: National Academy Press.

Schiffman S, Walker J, Dalton P, Lorig T, Raymer J, Shusterman D, et al. *Potential health effects of odor from animal operations, wastewater treatment, and recycling of byproducts*. J Agromed. 2000;7:7–81.

Burkholder, J. M., Mallin, M. A., Glasgow, H. B., Jr., Larsen, L. M., McIver, M. R., Shank, G. C., Deamer-Melia, N., Briley, D. S., Springer, J., Touchette, B. W., & Hannon, E. K. (1997). *Impacts to a coastal river and estuary from rupture of a swine waste holding lagoon.* Journal of Environmental Quality, *26*, 1451–1466.

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THE UNIVERSITY
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December 6, 2013

Via Email

Christine Lawson
NC Division of Water Resources
Animal Feeding Operations Unit
1636 Mail Service Center
Raleigh, North Carolina 27699-1636
christine.lawson@ncdenr.gov

Re: General Permit AWG100000

Dear Ms. Lawson:

North Carolina's general permits for animal waste management systems at industrial swine operations fail to protect public health and the environment. As noted below, there is a large body of evidence documenting the negative health impacts of industrial swine operations, also known as concentrated animal feeding operations (CAFOs).[1] These negative consequences result from the use of lagoons and spray fields to manage animal waste, non-therapeutic use of antibiotics in swine production, the location of confinements and animal waste in flood plains, and the disproportionate burden of CAFO pollutants on communities that are particularly susceptible due to presence of other environmental exposures and inadequate access to medical services. North Carolina communities rely on the Department of Environment and Natural Resources to protect their air, water, and health, and this protection should apply equally regardless of race and wealth. NC DENR currently fails to meet this responsibility and will continue to fail unless future permits are altered to reduce off-site pollution and increase transparency about animal production activities, and regulations are strictly enforced.

I. Negative Health Impacts of Swine CAFOs

Swine CAFOs with liquid waste management systems release numerous air pollutants including particulate matter, endotoxin (a respiratory irritant and allergen that comes from bacteria), ammonia, hydrogen sulfide (a toxic gas that comes from decomposing feces), and other malodorous chemicals. The air pollutants come from barns that house hundreds or thousands of pigs, from open fecal waste pits, and from fields where the waste is spread. Several decades' worth of research shows that, due to exposures inside these facilities, CAFO workers suffer a range of health problems.[2] More recent research indicates that neighbors of swine CAFOs experience numerous symptoms similar to those seen among workers,

[1] Rather than the strict federal definition we use the term "CAFO" to refer to large livestock operations that house animals in confinement.

[2] D. Cole, L. Todd, and S. Wing, "Concentrated Swine Feeding Operations and Public Health: A Review of Occupational and Community Health Effects," *Environ Health Perspect* 108, no. 8 (2000).

including irritation of the eyes, nose and throat, respiratory symptoms, reduced lung function, and asthma-related symptoms. Swine CAFO neighbors also suffer from negative mood states and reduced quality of life. We summarize this research here, emphasizing studies conducted in North Carolina.

In 2000, researchers published a study showing that neighbors of an eastern North Carolina swine CAFO reported more episodes of headache, runny nose, sore throat, coughing, diarrhea, and burning eyes than residents of comparison areas with a dairy and no CAFO. Swine CAFO neighbors also reported more frequent episodes when they could not open their windows or go outside their homes compared to residents of the comparison areas.[3]

In 2006, researchers published a study showing that students at North Carolina public middle schools located within three miles of swine CAFOs had more asthma-related symptoms, more doctor-diagnosed asthma, and more asthma-related medical visits than students who attended schools further from swine CAFOs. Children attending middle schools where school staff reported that livestock odor was present inside the school twice or more per month had a 23% higher prevalence of wheezing symptoms compared to children who attended schools where no livestock odor was reported.[4] Particles and gases released from swine CAFO liquid waste storage and land application can produce these impacts, which have also been observed in other states.

More recently, investigators set up monitors to measure levels of air pollutants (airborne particles, endotoxin and hydrogen sulfide) outside the homes of eastern North Carolina residents who lived within 1.5 miles of one or more swine CAFOs. While the pollutants were being measured, community members reported twice daily about their mood and symptoms of illness. They also measured their lung function and blood pressure, and they reported the strength of the swine odor that they smelled inside and outside of their homes.

The study demonstrated that concentrations of CAFO pollutants recorded by the air monitors were correlated with neighbors' reports of swine odor.[5] This finding clearly shows that swine CAFO pollutants travel into neighboring communities where they are inhaled by residents. When swine odor was stronger, participants more often reported that their daily life activities were interrupted and that they felt stressed, gloomy, angry, and unable to concentrate. Higher levels of hydrogen sulfide and semi-volatile particles were associated with reports of feeling stressed or annoyed and nervous or anxious.[6] Swine CAFO neighbors report that they have lost some of the most treasured parts of their rural way of life, that family and community gatherings are no longer possible, that they can no longer use their private wells as a source for drinking water, and that their properties have depreciated in value.[7]

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[3] S. Wing and S. Wolf, "Intensive Livestock Operations, Health, and Quality of Life among Eastern North Carolina Residents," *Environ Health Perspect* 108, no. 3 (2000).
[4] M. C. Mirabelli et al., "Asthma Symptoms among Adolescents Who Attend Public Schools That Are Located near Confined Swine Feeding Operations," *Pediatrics* 118, no. 1 (2006).
[5] S. Wing et al., "Air Pollution and Odor in Communities near Industrial Swine Operations," *Environ Health Perspect* 116, no. 10 (2008).
[6] R. A. Horton et al., "Malodor as a Trigger of Stress and Negative Mood in Neighbors of Industrial Hog Operations," *Am J Public Health* 99 Suppl 3(2009).
[7] M. Tajik et al., "Impact of Odor from Industrial Hog Operations on Daily Living Activities," *New Solut* 18, no. 2 (2008).

In the same study, higher levels of hydrogen sulfide were associated with reports of irritation of the eyes and nose, and with runny nose and difficulty breathing. Particle pollution was associated with reports of poor appetite, burning eyes, nasal irritation, wheezing, difficulty breathing, and decreases in lung function. Higher levels of endotoxin were associated with nausea, chest tightness, and sore throat.[8]

Swine CAFO odors and hydrogen sulfide concentrations in these communities were also associated with neighbors' blood pressure levels.[9] Elevated blood pressure is a well-recognized cause of stroke and heart disease, and the area of eastern North Carolina with the highest density of swine CAFOs is part of a region known as the "stroke belt." Residents of this region, who already suffer excess hypertension-related disease, should not be exposed to pollutants from swine CAFOs that further raise their blood pressures. Additionally, treatment of high blood pressure is a financial burden to patients as well as to private and public insurance systems.

Results from these studies represent average responses among study participants. Some people are more sensitive to environmental exposures than others. Overall, however, the studies provide solid evidence, consistent with findings from worker studies and studies in other regions, that air pollutants from swine CAFOs negatively impact health and quality of life.

In addition to studies of swine CAFO air pollution conducted in our state, a growing body of evidence from other states and countries shows that swine, poultry, and cattle CAFOs contaminate air and water and negatively impact the health and quality of life in neighboring communities.[10] Furthermore, hundreds of CAFOs in eastern North Carolina are located in areas subject to flooding that can transport liquid wastes into local communities,[11] and runoff can convey fecal pollution and associated pathogens to surface and ground water supplies and soils.[12] It is just a matter of time before another flood causes massive loss of liquid waste from the thousands of fecal waste lagoons that are in our state's flood plains.

Another concern is the widespread use of antibiotics in CAFOs. Research shows that the use of antibiotics in CAFOs has contributed to the emergence of antibiotic resistant bacteria that can cause dangerous, difficult-to-treat human infections.[13] Airborne bacteria, including antibiotic resistant strains, have been connected to CAFO air emissions,[14] and antibiotic resistant bacteria are associated with animal vectors

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[8] L. Schinasi et al., "Air Pollution, Lung Function, and Physical Symptoms in Communities near Concentrated Swine Feeding Operations," *Epidemiology* 22, no. 2 (2011).

[9] S Wing et al., "Air pollution from industrial swine operations and blood pressure of neighboring residents. Environmental Health Perspectives. 121:92-96, (2013).

[10] K. Radon et al., "Environmental Exposure to Confined Animal Feeding Operations and Respiratory Health of Neighboring Residents," *Epidemiology* 18, no. 3 (2007); P. J. Villeneuve et al., "Intensive Hog Farming Operations and Self-Reported Health among Nearby Rural Residents in Ottawa, Canada," *BMC Public Health* 9(2009); P. S. Thorne, "Environmental Health Impacts of Concentrated Animal Feeding Operations: Anticipating Hazards--Searching for Solutions," *Environ Health Perspect* 115, no. 2 (2007).

[11] Wing et al., "The potential impact of flooding on confined animal feeding operations in eastern North Carolina," *Environ Health Perspect* 110, no. 4 (2002).

[12] Casteel et al., "Fecal contamination of agricultural soils before and after hurricane-associated flooding in North Carolina," *J Environ Sci Health A Tox Hazard Subst Environ Eng* 41, no. 2 (2006).

[13] E. K. Silbergeld et al., "One Reservoir: Redefining the Community Origins of Antimicrobial-Resistant Infections," *Med Clin North Am* 92, no. 6 (2008). E. K. Silbergeld, J. P. Graham, and L. B. Price, "Industrial Food Animal Production, Antimicrobial Resistance, and Human Health," *Annu. Rev. Public Health* 29, no. 15 (2008).

[14] J Schulz et al., "Longitudinal Study of the Contamination of Air and of Soil Surfaces in the Vicinity of Pig Barns by Livestock-Associated Methicillin-Resistant Staphylococcus aureus," *Appl Environ Microbiol* 78(16), 5666-5671 (2012). C. F.

near CAFOs, including flies,[15] rodents,[16] and migratory geese that land on North Carolina's swine waste lagoons.[17] A recent medical records study from Pennsylvania shows that people living near swine waste application sites have elevated hospitalization for infections with methicillin resistant *Staphylococcus aureus* (MRSA).[18] North Carolina swine and poultry CAFO workers carry strains of *Staphylococcus aureus* that are associated with livestock in general, and swine in particular,[19] that could be spread by liquid waste.

II. North Carolina's Swine CAFOs Overburden Low-Income Communities of Color

Research based on a review of state and federal records shows that North Carolina's swine CAFOs are disproportionately located in low-income communities of color.[20] Low-income people of color are more susceptible to CAFO pollution because of older housing, less access to air conditioning, increased exposures to other environmental and occupational hazards, higher prevalence of medical conditions that can be exacerbated by exposure to CAFO pollution, and inadequate access to medical services. The disproportionate burden of swine CAFOs in low-income communities of color represents an environmental injustice. Industrial swine production creates profits for out-of-state corporations and provides cheap pork for consumers at the expense of the health and dignity of eastern North Carolina residents who bear the brunt of the local pollution and health impacts. Additionally, the large numbers of CAFOs make these communities unattractive for economic development that would bring clean industries and good jobs.

The problem is not farming, rather it is the industrial production of animals in concentrations that produce massive quantities of waste and pollutants. These practices would never be tolerated in wealthy communities. In North Carolina, CAFO pollution is permitted by the Department of Environment and Natural Resources. The top ten swine-producing counties in the United States are all in eastern North Carolina; the health and environmental impacts of swine production in our state are not simply due to pollution from individual facilities, but result from the density of these operations. Sadly, our regulatory system has forsaken rural residents by allowing the destruction of their health and quality of life.

Green et al., "Bacterial Plume Emanating from the Air Surrounding Swine Confinement Operations," *J. Occup & Environ Hygiene*, 3:9-15, 2006. S. G. Gibbs, et al., "Isolation of Antibiotic-Resistant Bacteria from the Air Plume Downwind of a Swine Confined or Concentrated Animal Feeding Operation," *Environ Health Perspect*, 114:1032-1037, 2006.

[15] A. M. Rule et al., "Food animal transport: A potential source of community exposures to health hazards from industrial farming (CAFOs)," *J Infect & Pub Health*, 1:33-39, 2008.

[16] A. Van de Giessen, et al., "Occurrence of methicillin-resistant Staphylococcus aureus in rats living on pig farms," *Preventive Veterinary Medicine*, 91(2):270-273, 2009.

[17] D. Cole et al., "Free-livingCanada Geese and Antimicrobial Resistance," *Emerging Infectious Diseases*, 11:935-938, 2005.

[18] JA Casey et al., "High-Density Livestock Operations, Crop Field Application of Manure, and Risk of Community-Associated Methicillin-Resistant Staphylococcus aureus Infection in Pennsylvania," JAMA Internal Medicine, September 16, 2013.

[19] JL Rinsky et al., "Livestock-associated methicillin and multidrug resistant Staphylococcus aureus is present among industrial, not antibiotic-free livestock operation workers in North Carolina," PLoS ONE, 8(7): e67641, 2013. doi:10.1371/journal.pone.0067641.

[20] S. Wing, D. Cole, and G. Grant, "Environmental Injustice in North Carolina's Hog Industry," *Environ Health Perspect* 108, no. 3 (2000).

III. DENR Should Provide Records Needed to Document Environmental and Health Impacts

The ability of scientists to document health and environmental impacts of CAFO pollutants, and the ability of the public to become aware of the economic, social and health costs of the current system, is hampered by inadequate public availability of records. We request that DENR compile electronic records of information that permittees are required to collect and make them publicly available. These include:

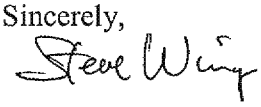
- The waste level in each lagoon (freeboard levels) (III.2(a))
- Precipitation events, including rain levels (III.3)
- Soil fertility (III.4)
- The amount of nitrogen, phosphorus, zinc, and copper in the waste (III.5) as well as arsenic
- Dates of irrigation and land application events, quantities of liquid applied on each day, and other information about land application including hydraulic loading rates, nutrient loading rates, and cropping information, as well as information as to whether solids were removed and information about how those solids were disposed on site, or offsite (if applicable) (III.6)
- Waste transfers between structures on site that are not typically operated in a series (III.7)
- Monthly stocking records (these records are given to DENR, III.8)

In particular we request that DENR obtain each permittee's daily record of the quantities and locations of animal waste applied to land. We also request that DENR make public the boundaries of each field where swine waste is applied to land and detailed information about all pharmaceuticals and other additives in each permitee's swine feed. This information is important for advancing the scientific understanding of environmental and health impacts of land-application of manure and it is critical to the public's right-to-know about environmental pollutants and their costs to neighboring communities and the general public.

IV. Conclusion

The body of research documenting the damage that industrial swine production causes to human and environmental health continues to grow, and these burdens disproportionately impact communities of color and low income communities. More information about swine CAFOs should be publicly available to allow scientists and concerned citizens to monitor potential impacts. We urge you to modify CAFO permits to set a date in the near future after which the following will be prohibited: 1) the management of swine waste using lagoons and spray fields, 2) the non-therapeutic use of antibiotics in livestock production, and 3) the location of animal confinements and animal waste storage in flood plains. These changes are the minimum required to preserve the health and well-being of rural residents near swine operations.

Sincerely,



Steve Wing, Ginger T. Guidry, Sarah Hatcher and Jessica Rinsky
UNC-CH School of Public Health

To: Garbow, Avi[Garbow.Avi@epa.gov]
From: Packard, Elise
Sent: Tue 10/4/2016 4:02:12 PM
Subject: FW: document for DOJ
REACH - NC DEQ Swine case Roundtable chart 9 9 2016.docx

Here you go!

Elise B. Packard

Associate General Counsel for Civil Rights and Finance

U.S. EPA Office of General Counsel, Rm. 7353C

(202) 564-7729

From: Packard, Elise
Sent: Thursday, September 29, 2016 4:02 PM
To: Garbow, Avi <Garbow.Avi@epa.gov>
Cc: Shenkman, Ethan <Shenkman.Ethan@epa.gov>; Rhodes, Julia <Rhodes.Julia@epa.gov>
Subject: document for DOJ

Hi Avi,

Ex. 5 - Deliberative Process

Thanks.

Elise

Elise B. Packard

Associate General Counsel for Civil Rights and Finance

U.S. EPA

To: Garbow, Avi[Garbow.Avi@epa.gov]
From: Fritz, Matthew
Sent: Thur 9/8/2016 2:54:49 AM
Subject: Re: FOLLOW UP CALL WITH MARIANNE TO FINALIZE -- Request for a Meeting

Not yet. Thanks.

On Sep 7, 2016, at 9:45 PM, Garbow, Avi <Garbow.Avi@epa.gov> wrote:

> You in Merida? Hope travels good so far.
>
> Avi Garbow
> General Counsel, US EPA
>
> Sent from my iPhone
>
> On Sep 7, 2016, at 9:42 PM, Fritz, Matthew <Fritz.Matthew@epa.gov> wrote:
>
>> Lilian,
>>
>> I can make the 5th work.
>>
>> On Sep 7, 2016, at 4:55 PM, Dorka, Lilian <Dorka.Lilian@epa.gov> wrote:
>>
>>> Hello Everyone, I just spoke with Marianne about finalizing this meeting. She would prefer to meet on October 5th or 6th in order to give the complainants, who will be traveling up from NC, a little more time to plan this trip. She understands that Avi will not be available on either of these dates but is willing to go forward if all others are available: Matt F – subject to something coming up needing his attention; Ethan/Elise for Avi; Matt T, Mustafa and Charles; Ken and me.
>>>
>>> Can those listed above please let me know by noon tomorrow whether you would be available on October 5th from 3:00-4:00 PM?
>>>
>>> **Alternative time/date:**
>>>
>>> **October 5th from 4:00-5:00 PM**
>>>
>>> **October 6th from 10:00-11:00 AM**

Thanks very much! Lilian

Lilian Sotolongo Dorka

Acting Director, EPA, Office of Civil Rights

202-564-9649

WJC-N Room 2450

From: Dorka, Lilian
Sent: Tuesday, August 30, 2016 4:07 PM
To: Ali, Mustafa <Ali.Mustafa@epa.gov>
Cc: Veney, Carla <Veney.Carla@epa.gov>; Fritz, Matthew <Fritz.Matthew@epa.gov>; Tejada, Matthew <Tejada.Matthew@epa.gov>; Lapierre, Kenneth <lapierre.kenneth@epa.gov>; HALIM-CHESTNUT, NAIMA <Halim-Chestnut.Naima@epa.gov>; mcteer_toney.heather@epa.gov; O'Lone, Mary <olone.mary@epa.gov>; Covington, Jeryl <Covington.Jeryl@epa.gov>; Isales, Daniel <Isales.Daniel@epa.gov>; Farrell, Ericka <Farrell.Ericka@epa.gov>; Temple, Kurt <Temple.Kurt@epa.gov>; Rhodes, Julia <Rhodes.Julia@epa.gov>; Packard, Elise <Packard.Elise@epa.gov>
Subject: RE: Request for a Meeting

Thanks so much Mustafa.

Lilian Sotolongo Dorka

Acting Director, EPA, Office of Civil Rights

202-564-9649

WJC-N Room 2450

From: Ali, Mustafa
Sent: Tuesday, August 30, 2016 3:52 PM
To: Dorka, Lilian <Dorka.Lilian@epa.gov>
Cc: Veney, Carla <Veney.Carla@epa.gov>; Fritz, Matthew <Fritz.Matthew@epa.gov>; Tejada, Matthew <Tejada.Matthew@epa.gov>; Lapierre, Kenneth <Lapierre.Kenneth@epa.gov>; HALIM-CHESTNUT, NAIMA <Halim-Chestnut.Naima@epa.gov>; mcteer_toney.heather@epa.gov; O'Lone, Mary <OLone.Mary@epa.gov>; Covington, Jeryl <Covington.Jeryl@epa.gov>; Isales, Daniel <Isales.Daniel@epa.gov>; Farrell, Ericka <Farrell.Ericka@epa.gov>; Temple, Kurt <Temple.Kurt@epa.gov>; Rhodes, Julia <Rhodes.Julia@epa.gov>; Packard, Elise <Packard.Elise@epa.gov>
Subject: Re: Request for a Meeting

Lilian,

I'm in South Carolina at the moment. Feel free to move forward and I will call in if I can on the 23rd. If the meeting moves to October I'm available on the 5th & 6th.

Blessings

Mustafa

Sent from my iPhone

On Aug 30, 2016, at 3:05 PM, Dorka, Lilian <Dorka.Lilian@epa.gov> wrote:

> OK good to know. It looks like the 23rd will not work for Mustafa so we will need to figure this out.

> Lilian Sotolongo Dorka
>
> Acting Director, EPA, Office of Civil Rights
>
> 202-564-9649
>
> WJC-N Room 2450

From: Veney, Carla
Sent: Tuesday, August 30, 2016 1:15 PM
To: Dorka, Lilian <Dorka.Lilian@epa.gov>
Cc: Fritz, Matthew <Fritz.Matthew@epa.gov>; Ali, Mustafa <Ali.Mustafa@epa.gov>; Tejada, Matthew <Tejada.Matthew@epa.gov>; Lapierre, Kenneth <Lapierre.Kenneth@epa.gov>; HALIM-CHESTNUT, NAIMA <Halim-Chestnut.Naima@epa.gov>; mcteer_toney.heather@epa.gov; O'Lone, Mary <OLone.Mary@epa.gov>; Covington, Jeryl <Covington.Jeryl@epa.gov>; Isales, Daniel <Isales.Daniel@epa.gov>; Farrell, Ericka <Farrell.Ericka@epa.gov>; Temple, Kurt <Temple.Kurt@epa.gov>; Rhodes, Julia <Rhodes.Julia@epa.gov>; Packard, Elise <Packard.Elise@epa.gov>
Subject: RE: Request for a Meeting

Avi will be on travel October 5th and 6th.

From: Garbow, Avi
Sent: Tuesday, August 30, 2016 12:16 PM
To: Dorka, Lilian <Dorka.Lilian@epa.gov>
Cc: Fritz, Matthew <Fritz.Matthew@epa.gov>; Ali, Mustafa <Ali.Mustafa@epa.gov>; Tejada, Matthew <Tejada.Matthew@epa.gov>; Lapierre, Kenneth <Lapierre.Kenneth@epa.gov>; HALIM-CHESTNUT, NAIMA <Halim-Chestnut.Naima@epa.gov>; mcteer_toney.heather@epa.gov; O'Lone, Mary <OLone.Mary@epa.gov>; Covington, Jeryl <Covington.Jeryl@epa.gov>; Isales, Daniel <Isales.Daniel@epa.gov>; Farrell, Ericka <Farrell.Ericka@epa.gov>; Temple, Kurt <Temple.Kurt@epa.gov>; Rhodes, Julia <Rhodes.Julia@epa.gov>; Packard, Elise <Packard.Elise@epa.gov>; Veney, Carla <Veney.Carla@epa.gov>
Subject: Re: Request for a Meeting

Adding Carla Veney.

Avi Garbow

General Counsel, US EPA

Sent from my iPhone

On Aug 30, 2016, at 12:12 PM, Dorka, Lilian <Dorka.Lilian@epa.gov> wrote:

Hello everyone, I heard back from Marianne that of the dates we provided, it looks like September 23rd might work. If you could please hold the afternoon of 9/23, I would appreciate it, until she can confirm a time. She also asked if I would check on the afternoon of October 5th and 6th.

Is there anyone who cannot make October 5th or 6th between 2:00 and 5:00? Thanks very much! Lilian

Lilian Sotolongo Dorka

Acting Director, EPA, Office of Civil Rights

202-564-9649

WJC-N Room 2450

From: Dorka, Lilian
Sent: Monday, August 29, 2016 8:46 PM
To: Fritz, Matthew <Fritz.Matthew@epa.gov>; Ali, Mustafa <Ali.Mustafa@epa.gov>; Garbow, Avi <Garbow.Avi@epa.gov>; Tejada, Matthew <Tejada.Matthew@epa.gov>; Lapierre, Kenneth <lapierre.kenneth@epa.gov>
Cc: HALIM-CHESTNUT, NAIMA <Halim-Chestnut.Naima@epa.gov>; 'mcteer_toney.heather@epa.gov' <mcteer_toney.heather@epa.gov>; O'Lone, Mary <olone.mary@epa.gov>; Covington, Jeryl <Covington.Jeryl@epa.gov>; Isales, Daniel <Isales.Daniel@epa.gov>; Farrell, Ericka <Farrell.Ericka@epa.gov>; Temple, Kurt

<Temple.Kurt@epa.gov>; Rhodes, Julia <Rhodes.Julia@epa.gov>; Packard, Elise <Packard.Elise@epa.gov>
Subject: RE: Request for a Meeting

Hi all, just wanted to let you know that based on the feedback I received re your availability, here is what it looks like and proposed dates I will be sharing with Marianne tomorrow morning. Thank you!

9/13: 2:30 – 3:30

9/19: 4:00 – 5:00

9/23: 2:30 – 3:30

3:30 – 4:30

4:30 – 5:30

Lilian Sotolongo Dorka

Acting Director, EPA, Office of Civil Rights

202-564-9649

WJC-N Room 2450

From: Dorka, Lilian
Sent: Monday, August 29, 2016 11:07 AM
To: Fritz, Matthew <Fritz.Matthew@epa.gov>; Ali, Mustafa <Ali.Mustafa@epa.gov>; Garbow, Avi <Garbow.Avi@epa.gov>; Tejada, Matthew <Tejada.Matthew@epa.gov>; Lapierre, Kenneth <lapierre.kenneth@epa.gov>
Cc: HALIM-CHESTNUT, NAIMA <Halim-Chestnut.Naima@epa.gov>; 'mcteer_toney.heather@epa.gov' <mcteer_toney.heather@epa.gov>; O'Lone, Mary <olone.mary@epa.gov>; Covington, Jeryl <Covington.Jeryl@epa.gov>; Isales, Daniel <Isales.Daniel@epa.gov>; Farrell, Ericka <Farrell.Ericka@epa.gov>; Temple, Kurt

<Temple.Kurt@epa.gov>; Rhodes, Julia <Rhodes.Julia@epa.gov>; Packard, Elise <Packard.Elise@epa.gov>
Subject: RE: Request for a Meeting
Importance: High

Hello Matt, Avi, Mustafa, Matt and Ken – I have a call scheduled with Marianne for 9:00 AM tomorrow to give her some possible dates for this meeting. Could you please tell me by COB today whether any of these dates DO NOT work for you? I will try to accommodate everyone's availability. I am trying to schedule a 1 hour meeting. (They tend to ask for afternoon meetings.)
Thanks! Lilian

9/13: 2:30-3:30; 3:30-4:30; or 4:30-5:30

9/14: 3:00-4:00; or 4:00-5:00

9/15: 1:00-2:00; or 2:00-3:00

9/16: Anytime between 1:00 and 4:00

9/19: 3:00-4:00; or 4:00-5:00

9/22: 1:00-2:00; 2:00-3:00

9/23: 2:30-3:30; 3:30-4:30; or 4:30-5:30

Lilian Sotolongo Dorka

Acting Director, EPA, Office of Civil Rights

202-564-9649

WJC-N Room 2450

From: Marianne Engelman Lado [mailto:mengelmanlado@earthjustice.org]
Sent: Friday, August 19, 2016 5:50 PM
To: Fritz, Matthew <Fritz.Matthew@epa.gov>; Ali, Mustafa <Ali.Mustafa@epa.gov>; Dorka, Lilian <Dorka.Lilian@epa.gov>; Garbow, Avi <Garbow.Avi@epa.gov>; Tejada, Matthew <Tejada.Matthew@epa.gov>
Cc: Alexis Andiman <aandiman@earthjustice.org>; 'Haddix, Elizabeth McLaughlin (emclaugh@email.unc.edu)' <emclaugh@email.unc.edu>; 'Ducharme, Brent' <ducharme@email.unc.edu>; 'Dorosin, Mark (dorosin@email.unc.edu)' <dorosin@email.unc.edu>; HALIM-CHESTNUT, NAIMA <Halim-Chestnut.Naima@epa.gov>; 'mcteer_toney.heather@epa.gov' <mcteer_toney.heather@epa.gov>
Subject: Request for a Meeting

Dear Mr. Fritz, Mr. Garbow, Mr. Ali, Ms. Dorka, and Mr. Tejada,

I'm writing on behalf of the North Carolina Environmental Justice Network, REACH and Waterkeeper Alliance, Inc. to request a meeting to discuss the impact of swine facilities in Eastern North Carolina operating under the state permit granted by North Carolina's Department of Environmental Quality (DEQ) and, particularly, the status of the investigation into whether DEQ violated Title VI and EPA regulations in permitting more than 2,000 swine CAFOs without conducting a disparate impact analysis and without sufficient protection of people's health and the environment, all of which has a disparate impact on the basis of race and national origin.

Complainants have invited OCR to come to North Carolina to speak with them and tour the area as part of its investigation, but OCR has not yet visited the community. At this point, also, almost two years have passed since we filed the complaint. The investigation is something of a black box for complainants, so it is hard to know whether the investigation is proceeding in a thorough and diligent way. Our clients want to convey to EPA directly how this permit daily affects their lives and request a meeting for this purpose. Representatives of each group are willing to travel to Washington to meet with you. As you know, it's often helpful to get into a room together to discuss an issue. We were hoping to find a date in September, which marks the second anniversary

of the filing date.

Please let me know the best way to proceed with making arrangements for the meeting and who might serve as a point person in order to put a date on the calendar. I'm also cc'ing my co-counsel at Earthjustice and the UNC School of Law Center for Civil Rights.

I appreciate your attention.

Best,

Marianne

Marianne Engelman Lado

Senior Staff Attorney

Earthjustice

48 Wall Street, 19th Floor

New York, NY 10005

T: 212.845.7393

F: 212.918.1556

earthjustice.org

<image001.gif>

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Message

From: Patrick, Monique [Patrick.Monique@epa.gov]
Sent: 8/29/2016 3:45:36 PM
To: Garbow, Avi [Garbow.Avi@epa.gov]
Subject: RE: Request for a Meeting

I'm on it.

From: Garbow, Avi
Sent: Monday, August 29, 2016 11:45 AM
To: Patrick, Monique <Patrick.Monique@epa.gov>
Subject: FW: Request for a Meeting
Importance: High

M,
Would you mind getting back to Lilian with my availability, as requested below? Thanks very much.

avi

Avi Garbow
General Counsel
U.S. Environmental Protection Agency
(202) 564-8040

From: Dorka, Lilian
Sent: Monday, August 29, 2016 11:07 AM
To: Fritz, Matthew <Fritz.Matthew@epa.gov>; Ali, Mustafa <Ali.Mustafa@epa.gov>; Garbow, Avi <Garbow.Avi@epa.gov>; Tejada, Matthew <Tejada.Matthew@epa.gov>; Lapierre, Kenneth <Lapierre.Kenneth@epa.gov>
Cc: HALIM-CHESTNUT, NAIMA <Halim-Chestnut.Naima@epa.gov>; 'mcteer_toney.heather@epa.gov' <mcteer_toney.heather@epa.gov>; O'Lone, Mary <OLone.Mary@epa.gov>; Covington, Jeryl <Covington.Jeryl@epa.gov>; Isales, Daniel <Isales.Daniel@epa.gov>; Farrell, Ericka <Farrell.Ericka@epa.gov>; Temple, Kurt <Temple.Kurt@epa.gov>; Rhodes, Julia <Rhodes.Julia@epa.gov>; Packard, Elise <Packard.Elise@epa.gov>
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Lilian Sotolongo Dorka
Acting Director, EPA, Office of Civil Rights
202-564-9649
WJC-N Room 2450

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Sent: Friday, August 19, 2016 5:50 PM
To: Fritz, Matthew <Fritz.Matthew@epa.gov>; Ali, Mustafa <Ali.Mustafa@epa.gov>; Dorka, Lilian <Dorka.Lilian@epa.gov>; Garbow, Avi <Garbow.Avi@epa.gov>; Tejada, Matthew <Tejada.Matthew@epa.gov>
Cc: Alexis Andiman <aandiman@earthjustice.org>; 'Haddix, Elizabeth McLaughlin (emclaugh@email.unc.edu)' <emclaugh@email.unc.edu>; 'Ducharme, Brent' <ducharme@email.unc.edu>; 'Dorosin, Mark (dorosin@email.unc.edu)' <dorosin@email.unc.edu>; HALIM-CHESTNUT, NAIMA <Halim-Chestnut.Naima@epa.gov>; 'mcteer_toney.heather@epa.gov' <mcteer_toney.heather@epa.gov>
Subject: Request for a Meeting

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Please let me know the best way to proceed with making arrangements for the meeting and who might serve as a point person in order to put a date on the calendar. I'm also cc'ing my co-counsel at Earthjustice and the UNC School of Law Center for Civil Rights.

I appreciate your attention.

Best,

Marianne

Marianne Engelman Lado
Senior Staff Attorney
Earthjustice
48 Wall Street, 19th Floor
New York, NY 10005
T: 212.845.7393
F: 212.918.1556
earthjustice.org

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