

## 5-7-18 Landfill Criteria Matrix Meeting

### In-depth review of carbon footprint calculations – Matrix Items 1A and 1B

**Jason McCombs:** We talked about, if I'm seeing this right, we're still on the equation either HH6 or HH8. Correct? Two potential ways to calculate landfill emissions. HH8, correct me if I'm wrong here, but it's the idea is that the amount of gas generated and then you subtract the amount collected. Is that correct?

**Rajiv Patel:** No, that one would be HH6.

**Jason McCombs:** This is the 6.

**Rajiv Patel:** Right.

**Kaiba White:** Six is the amount collected? Or 6 is the amount generated?

**Rajiv Patel:** Yeah, I guess, I can quickly... so there's two ways to calculate your reported emissions. So one, you basically put into the equation the amount of waste that you take in every year. You put that in and it estimates the amount of gas that you generate and then you subtract out what you collect with your gas collection system. So that number that you subtract out is actually based off of what you monitor. So that's one way. So that difference you assume goes to that. And then the second method, it just takes the amount that you have monitored as collected, and you back-calculate based off your collection efficiency what would have gone into the atmosphere. So that one maybe can be a little more accurate because it's just based off of real data that you've collected. The only problem with that one is your gas collection efficiency is, again, it's an estimate based off of how much surface area of waste you've got in place that's got intermediate cover with gas collection or without, how much has final cover with gas collection or without, how much doesn't have cover, you know.

**Kaiba White:** So is that the formula where you assume that the radius that it's collecting from...?

**Rajiv Patel:** Yeah and so the issue with the radius, or not the issue, but the thing with the radius, so there's no actual, in the EPA's formulas or on the eGrid tool where you submit online, there's no place where it says how to make that assumption that each well captures this radius of gas, or whatever. So that's kind of at the discretion of the landfills to do, you know, based off the type of covers they have, based off the type of wells they've got, and those ranges can be anywhere from 100-foot radius to 400-foot radius, you know, just kind of depending on where the landfill puts that. But that's kind of how you would factor it. You'd say okay, we've got this many square meters covered by gas collection, this many square meters not. This much square meters has gas collection and this type of cover. So that's where those... you see the five categories on the bottom? That's kind of what you fill in for your surface areas.

**Kaiba White:** Okay, thanks.

**Rajiv Patel:** So then based off of that, it spits out a collection efficiency. And it's a real simple, that one's a real simple calc, it's just surface area times the percentage they allow for that type of cover and gas collection and it's just kind of an effective average.

**Kaiba White:** Is there a reason that this calculation couldn't account for what goes into the landfill?

**Rajiv Patel:** Which one?

**Kaiba White:** The second calculation that you were just describing. You said that it doesn't account for what is put in the landfill.

**Rajiv Patel:** Right, right. That one, it accounts for it but just based off the, basically the gas you're collecting, you know.

**Kaiba White:** Sorry... *(inaudible)*

**Unknown Speaker:** We were probably right in the middle.

**Jason McCombs:** Yeah, we're still trying to figure it out... *(inaudible)* So if I'm understanding there's this HH6 model and this HH8 model that's being proposed and we would need to probably choose between these two.

**Chris Thomas:** You can choose, choose the second one the landfill can't use it. They don't have... *(inaudible)*

**Rajiv Patel:** Yeah.

**Chris Thomas:** They're gonna have to use a....

**Steve Jacobs:** But they are producing gases.

**Rajiv Patel:** Right.

**Steve Jacobs:** So the question for the City is do they care if a new landfill meets the rules or whether they're releasing gases.

**Chris Thomas:** Right. They'll still be emitting but they won't have the system there and so they're gonna have to model that. It probably overestimates the gas in there which could potentially put you guys in a situation where you're overestimating your gas, and kind of like where TDS is sitting right now. It depends on what model that you're using. It may look like you're getting more gas than...

**Steve Jacobs:** I think we're getting sideways because if the criteria is greenhouse gas emissions, compliance with NSPS is irrelevant. We have landfills that have gone through the Tier II testing and aren't required to have a gas system in by the federal rules. Some of them we have gas systems in, some we do not. Williamson County is not on the NSPS. It had the Tier II testing and was able to go through it but we have a gas system in place. TDS, I'm assuming, went through the same process and made the decision to put a gas system in place.

**Bob Gregory:** It was a voluntary effort.

**Steve Jacobs:** Yeah, but what I'm saying, Bob, is you're not regulatorily required to put one in, you did it voluntarily.

**Bob Gregory:** That's exactly right.

**Steve Jacobs:** Right and we have facilities, the same thing with the new site is they would be generating greenhouse gases it would then be a management decision as to whether they want to put in a control system or not.

**Alfonso Sifuentes:** And I think that's one of the things that we addressed, Steve, about not penalizing new facilities but also providing some type of a credit for having gas capture systems in place...

**Steve Jacobs:** Right, but if the criteria is to reduce greenhouse gas emissions, then if you choose not to put one in, then you should be penalized for it.

**Bob Gregory:** Well, yes and no. If the plan, the landfill design, calls for 150, 200 feet of garbage and they only have 20 feet of garbage in, it's... and I don't know if it's appropriate to penalize them because they're putting one in and they've got another 100 feet of garbage to put over the top. But if they don't have much waste, in our case we're, what, 26 years old, whatever we are, somebody that's two years old, they've got so little waste in there's hardly any emissions... there's not as much emissions from it.

**Kaiba White:** That'll show up in the calculation.

**Steve Jacobs:** Yeah, but the calculation will show a smaller number.

**Bob Gregory:** Right.

**Steve Jacobs:** If it's not being captured. So it's, I mean, basically if you use one of the models it'll show how much gas is coming out of the new landfills and it'll be significantly less than your landfill or my landfill because we've got a whole lot more trash in there.

**Bob Gregory:** Right.

**Steve Jacobs:** So if they choose not to put in a collection system, their number's still gonna be smaller because they're not gonna have a whole lot of waste generating gas. It kind of fixes itself.

**Bob Gregory:** Well even our... yes, I agree. However the voluntary system in our case was 15 wells and now we're... it settled 20 to 30 feet, and then we just over the last six, eight months we filled that back up, not to total final cover, but just under it, and now we're installing, what is it, 65?

**Rajiv Patel:** Yeah, like 65. About 65.

**Bob Gregory:** Phase I, 65 and then in Phase II that is even yet to fill up that much, how many wells is that that TCEQ has approved?

**Larry Laine:** On Phase II, 15. On Phase I the total is 70. So you take the existing 15 and we'll add 55 more.

**Bob Gregory:** 55 new ones. So a voluntary system may be less because of the disruption and the problems with the gas collection system by adding 50 feet or 20 feet or 10 feet of garbage. But I guess the question comes down to a criteria, do we allow choices like the six or the eight, and do we evaluate, or does the City have a third party evaluator or somebody have a third party evaluator that looks at reasonableness. Why would Green Group Holdings install a gas collection system if they've got 15 feet of garbage of a total of 150 or more feet? But they could make that decision.

*(inaudible comment)*

**Bob Gregory:** Way less. Yeah, way less. So, but again...

**Brett O'Connor:** How old is your landfill? Twenty-something years old, right?

**Bob Gregory:** We opened in '91. February 1991.

**Brett O'Connor:** So yeah, you get large enough that you're gonna be, you're probably be emitting more and more, right, and then once you hit that threshold, it seems like there's a disadvantage.

**Alfonso Sifuentes:** But it's still a positive because we're emitting less.

**Rajiv Patel:** But there is a point where a landfill without gas collection will be emitting more even though they've got less waste than somebody who's collecting.

**Bob Gregory:** Yeah, only recently did we become large enough to hit the threshold of having to respond. Up until now it's still voluntary, but up until the deadline to start phasing them in, it's been voluntary. So we've had that, we've made that choice to do 15. I can imagine Green Group Holdings wouldn't do any for a good while but they should have the flexibility of either doing it voluntarily or presenting it and then justifying the numbers. And if they were to put 15 feet of garbage over 200 acres, say, and spend years and years and years filling it up, that's one thing. It just depends on how they develop the landfill, how we develop, how Williamson County develops. There should be some flexibility and then some evaluator, whether it's the City doing it or somebody else, some evaluation to say based on that evaluation here's how we... the reasonableness test.

**Kaiba White:** I have an engineering question.

**Bob Gregory:** Can you...

**Kaiba White:** I have an engineering question. You mentioned that you put in your collection system and then the waste settled and so you're filling it back up. So, it sounds like you must have pipes and equipment sticking up in the air 20 feet or so?

**Bob Gregory:** We had 15 wells and we put anywhere from 10 to maybe 30 feet at the maximum in Phase I, that we've raised it over the last 8 months and yes, we did extend those. But extending them 15 feet, it becomes a challenge because you don't have them slotted for the first phase. You don't want it sucking air from the outside conditions. So if you constantly apply every ten feet of garbage you add or so, you apply it, then you have to dig down and to take the non-slotted pipe out and put it in slotted. It's a pretty big ordeal to do it. But yes, at one time over the last year we had 15 wells sticking up an extra foot on how much waste we were gonna apply. And we went down and dealt with the slotting of the pipe. These are pretty technical things and you want to install them right. You don't want to have big zones that don't have any collection, just like you want people that do the square footage to evaluate the real footprint of garbage they have on the site so you know whether you've got areas that are subject to collection or forgotten about. And if it is forgotten because there were official closures or something, then that has to be taken into consideration. So it requires disclosure.

**Kaiba White:** It is possible to go back and expand an existing system.

**Bob Gregory:** You can. Yes, you can. As it settles it has a tendency of breaking pipes. Some wells go straight up so it settles around it. If you go laterally and you have differential settlement you can break the pipes and things, or kink them to where they don't work right. So it partly depends on the design of the landfill gas system, right guys?

**Kaiba White:** Do you maybe have something to add to that?

**Steve Jacobs:** No, I was just trying to figure out how many thousands of wells I'm responsible for. We do... we replace wells constantly.

**Kaiba White:** Okay.

**Steve Jacobs:** Operationally, they are a target for bulldozers. The headers settle as the landfill settles and fill up with water so, possibly going in and reworking the well field to get the covers removed...

**Bob Gregory:** In some cases, you have to do that. That's right.

**Steve Jacobs:** It's never-ending. You have to redrill the wells and possibly updating it. Probably our biggest single expense is the gas system.

**Kaiba White:** Okay.

**Jason McCombs:** Okay, so my question as far as these two systems, what do these kick out number wise? Are they comparable? Like as far as like how we're gonna score this and how we're gonna...

**Steve Jacobs:** Have we settled on how we determined what the starting number is?

**Rajiv Patel:** With the emissions?

**Steve Jacobs:** What are the potential emissions and how do we calculate that? Because the efficiency, no matter how you measure or do it on the gas system unless we agree on how much potentially is there to start with, I don't know how you do the math to determine the efficiency of the system.

**Chris Thomas:** You guys have the landfills at this point. All of us, we're just making stuff up to try to make everybody happy.

**Kaiba White:** So HH6...

**Chris Thomas:** Which calculation is the one that you guys would prefer to use that gives you the best number? The most accurate number? The second one?

**Rajiv Patel:** Yeah. I mean, HH8, the one that, for people that do have gas collection the second one should give you the more accurate number, assuming you're showing real numbers for your surface areas, your various surface areas. That's the key.

**Bob Gregory:** Rajiv, let me ask you a question. Aren't two of the basic things that we need to know is what is that surface area within the permit boundary for the different levels of cover.

**Rajiv Patel:** Right.

**Bob Gregory:** Whether it's not covered, well it's gonna have some cover on it, but whether it's just got daily cover so to speak or intermediate cover to a certain extent or final cover, and where that area is. To me that's one very critical thing we need to know.

**Rajiv Patel:** Yeah and that one's hugely critical because your gas collection efficiency is based off of that number. I mean that can cause such a big swing. If you're, if you calculate that your gas collection efficiency is 75% as opposed to 40, that's a 30% difference, you know.

**Bob Gregory:** Next point. Seems to me a very basic thing we need to know from everybody is whether they're doing it by the actual waste in place, the volume of waste in place, whether they got there with a default number, that may or may not represent what has been taken and the total waste in place, whether it's by the annual intake of tonnage of waste reported to TCEQ, recognizing that that's only been reported for a certain number of years...

**Rajiv Patel:** Yeah.

**Bob Gregory:** ...relatively, I don't know, 15 years, 20 years, something like that.

**Rajiv Patel:** Yeah.

**Bob Gregory:** And then before that there was no reporting required and so how does a landfill, depending on how old it is, determine how much waste is in place to use in the calculation? Is that right?

**Rajiv Patel:** Right, and so that won't affect the second calculation. It'll affect the HH6 calculation. But yeah, that number's only as accurate as the numbers that you put in for waste in place for each year, you know?

**Alfonso Sifuentes:** Also, too, it's important to verify, I mean, we talk about using variables that not only are measurable but can also to some extent be verified.

**Chris Thomas:** I assume these are numbers you submit to the TCEQ, so you kind of have to...

**Adam Gregory:** There's a lot of time... we're talking about the time periods even before the TCEQ reporting requirements. And they're...

**Rajiv Patel:** So a lot of the landfills have just used the same number for like 20 years in a row, you know? So you know that's not....

**Chris Thomas:** But if you're using that second calculation and assuming every year annually you submit these numbers, and most all of us that have landfills...*(inaudible)* in our facilities we use a third party, to come out and calculate these numbers and there's little if anything we can do to monkey around with it. We just put the numbers together and the numbers are the numbers, and you're submitting those, so I don't know if you need a technical review. These are actual publicly submitted numbers that go to the TCEQ.

**Bob Gregory:** That is true to a certain extent. More recently in the last 10 or 15 years when scales were required, there were numbers, and there are numbers even quoted on a quarterly basis since fees have been put in. So if you're gonna "cook the books" or something like that, you're gonna do it on your quarterly basis and then that rolls up into annual numbers. So prior to that, though, there was no fee, there was no quarterly report, there wasn't a requirement for scale. Only the larger landfills that converted to charging by the ton chose to install scales. So...

**Chris Thomas:** I don't think we have to worry about it if we're gonna use that second... the only person that's gonna have to worry about it is Green Group but they're already gonna be reporting on tons. So you use that second analysis that just goes on how much gas you collect and then you kind of extrapolate out how much you emit. The only difference is gonna be for a new landfill that doesn't have a collection system, you're gonna have to use the waste in place which...

**Bob Gregory:** Well, but what... it is easier for these guys because they've got so many requirements. We all have so many requirements for the last 10 or 15 years. I think the question goes to, is it okay to just assume the waste reported as collected versus how much is being emitted without being collected, or does it matter what the total waste in place is? The second method, which I think what you're saying is it doesn't even take into consideration...

**Rajiv Patel:** Right.

**Bob Gregory:** ...the waste that's in place.

**Rajiv Patel:** Right. That one just strictly calculates emissions off of what you've collected through your gas collection system.

**Adam Gregory:** And that's a reason to shy away, probably, from HH6, because HH6 does rely on those figures and there's, we know there's a lot of years where there have been default values used. The tons in place information is the one that's most likely to be ambiguous. But with HH8 you don't use that. But then what we becomes very, very important are the square meter calculations and that would be really the only thing necessarily subject to a verification or something like that.

**Rajiv Patel:** Yeah, because those square meters are used both for the gas collection efficiency, to determine that and to determine an oxidation factor which goes into the calculation. So those are two things, two key variables that can affect your emissions by 20% one way or the other, or 30%, whatever the case may be, but those are both based off of the surface areas that you put in. So that's why the surface areas that you put in are very important.

**Kaiba White:** So the two landfills that are existing, not the new one, do you all know how much... like, have you been using those default values?

**Steve Jacobs:** Not that I'm aware of.

**Bob Gregory:** What are we using and what have we used? Because we've had scales from day 1 opening our landfill, like...

**Kaiba White:** So you know how much waste...

**Bob Gregory:** We know how much waste is in place.

**Rajiv Patel:** Yeah, so for TDS we've used real numbers for waste in place for the whole lifespan of the, yeah.

**Kaiba White:** Okay, so everybody in this sample here either knows waste in place or will know waste in place. So I'm wondering if there is a way that we can, is it possible to merge these two methodologies in a way that accounts for the waste in place and the collection system?

**Steve Jacobs:** I think 8 does that because you would be factoring in the efficiency of your gas collection system over the whole site.

**Bob Gregory:** But 8 does not deal with the, correct me where I'm wrong, 8 does not deal with the total waste in place.

**Rajiv Patel:** Right. It kind of indirectly does because obviously...

**Steve Jacobs:** It's the total surface area.

**Rajiv Patel:** Well yeah, it does look at your surface area when you're doing gas collection but that emissions number of the gas collected, obviously that's a result of your waste in place. But you're not actually ever using that number. It's just a reality that you put in more waste and your gas collection system is gonna collect that gas, you know?

**Bob Gregory:** It is a reality if you collect gas from all the footprint.

**Rajiv Patel:** Right. Exactly.

**Bob Gregory:** If you don't collect gas from all the footprint then it does not reflect in that portion of the landfill footprint that has no gas collection system.

**Kaiba White:** And that's where the radius seems like a really critical number in that calculation, right?

**Rajiv Patel:** Yeah.

**Kaiba White:** So maybe...

**Bob Gregory:** Explain to me, what is radius?

**Kaiba White:** Out from the well collection.

**Bob Gregory:** Oh, the radius. Yeah, yeah. Yeah. Right.

**Kaiba White:** So maybe that's something we could come to an agreement on what that number is and everybody uses that same number.

**Adam Gregory:** That's site specific.

**Rajiv Patel:** That'll be real site specific because it's all kind of, again, that one...

**Kaiba White:** Can you explain why it's site specific?

**Rajiv Patel:** Yeah, so one of the first one is, do you have horizontal wells or vertical wells, that'll dictate...

**Kaiba White:** Okay, so...

**Rajiv Patel:** The second's how good...

**Steve Jacobs:** Intermediate cover... *(inaudible)*

**Rajiv Patel:** Exactly. The type of cover. How well is that cover maintained?

**Kaiba White:** So you're saying A 1 through 5 changes that radius?

**Steve Jacobs:** Yes.

**Rajiv Patel:** Or, I guess whatever you're using as your radius will affect how you fill A 1 through 5 out, right? So if you say you've got 100 wells and you are saying those 100 wells cover this radius of surface area, you know, then that's how you'll fill that out, right.

**Steve Jacobs:** Just for reference, the Sunset Farms landfill is closed and has a synthetic cap so their efficiency is about 95%.

**Kaiba White:** Okay.

**Steve Jacobs:** So they're basically a plastic bag. So they're able to capture all the gas that's generated. If you look at any of the other facilities that have final cover that's not synthetic, the efficiency's not as high.

**Kaiba White:** Okay, so the cover type determines the radius?

**Steve Jacobs:** It affects the radius.

**Rajiv Patel:** Yeah. The radius determines how much you put in each of those sections, hypothetically.

**Adam Gregory:** It determines gas coverage.

**Kaiba White:** But these are areas. Like an area is an area.

**Rajiv Patel:** Right. But you calculate area using a radius, right?

**Bob Gregory:** It's calculated in square meters.

**Kaiba White:** Oh, this is not total area...

**Rajiv Patel:** No, right. So you would say like, so say for this one, or let's use number 3. 'Area with daily soil cover and active gas collection.' So a facility would go in and say okay, how much area do you have with intermediate soil cover? How many wells are in that area? Can we say that those wells cover that entire area? That's where that radius...

**Kaiba White:** But how do you determine that number?

**Rajiv Patel:** That's the big variability.

**Adam Gregory:** Site specific determination based on all those factors down to the brand of the well you buy.

**Rajiv Patel:** There's no consistent way to do that. So you would just have to hope that every landfill is doing that as accurately as possible.

**Kaiba White:** Could you write out those factors for me?

**Rajiv Patel:** There isn't any. It's literally like, 'Oh, okay we've got this many wells on this square footage of the landfill. We maintain our cover without cracks, there's nothing like that. We can say the gas collection wells are collecting all that gas.'

**Kaiba White:** Okay, so whether or not the cover has cracks. What other... what are the other... you're saying it's all site specific, so...

**Rajiv Patel:** Right, so the type of wells you have, whether they're vertical, horizontal, that impacts it, the type of cover you've got in place.

**Adam Gregory:** Whether you use alternative daily cover or not.

**Rajiv Patel:** Yeah, alternative daily cover or not, how well is the cover maintained.

**Adam Gregory:** The type of intermediate cover you use.

**Rajiv Patel:** Intermediate cover, where the wells are located, you know, are they at the edge of the landfill, are they in the middle or pin-cushioned throughout.

**Steve Jacobs:** Moisture content.

**Rajiv Patel:** Moisture content, yeah.

**Steve Jacobs:** Barometric pressure?

**Rajiv Patel:** Right.

**Brett O'Connor:** The type of well head you use.

**Adam Gregory:** The type of well head, size of well head.

**Steve Jacobs:** I mean it is... you're literally dealing with an ever-changing season...

**Bob Gregory:** It's a living, breathing organism.

**Steve Jacobs:** You can have a gas well that you will have 150-foot radius of influence today...

**Rajiv Patel:** Right.

**Steve Jacobs:** ...and tomorrow it might be 50.

**Rajiv Patel:** Right.

**Steve Jacobs:** Because of changes and things going on in the landfill itself.

**Bob Gregory:** But you don't reinstall them on a daily basis.

**Rajiv Patel:** No.

**Kaiba White:** But you don't calculate...

**Bob Gregory:** You take into consideration of the give and take. That's the reason I was throwing out the possibility, and it may not be the thing to do, but the possibility of having some third-party evaluation to check and give an opinion on the fairness of it. Because they're not so cookie cutter that every landfill and every circumstance should have, logically... it's not like one guy uses a good engineer and one company uses a bad one. There's a basis for different assumptions given site specifics, particularly when one landfill is 50 years old and one hasn't even opened yet, you know, or will one day be two, three, four, five, and one landfill is 27 or whatever we are, and we'll be 30 and 40 and 50. So, site specifics matter.

**Steve Jacobs:** Yeah, but I don't know about the third party. Who do you pick to be the third party because my guess is if we had a third party that liked yours more than mine, I wouldn't like the third party.

**Bob Gregory:** No, there are issues with that. There is no question about it. However we all just experienced City staff making statements to ZWAC and the Solid Waste Panel, whatever that was called, the Council committee, subcommittee that met last summer on how horrible the TDS landfill emissions were and they were just going by what was stated based on assumptions that were allowed. Although, taking a look at it, we didn't know we were the fourth worst in the state and the 17<sup>th</sup> worst, like Waste Management has pointed those two numbers out at one of our previous meetings, in the nation. We weren't. Anybody that knows our facility knows we don't have an odor problem whatsoever. But yet what we reported, the assumptions we used, were really terribly unreasonable to the emissions side, although we...

**Steve Jacobs:** We have a pool to tell how much better you'll do next time.

**Bob Gregory:** Next time has already happened.

**Rajiv Patel:** Yeah, it was already submitted.

**Steve Jacobs:** We're guessing you won't be in the top 20.

**Bob Gregory:** March 1<sup>st</sup> was the...

**Rajiv Patel:** You can see it on here...

**Bob Gregory:** ...and you have it right here.

**Rajiv Patel:** ...what historically we used. We used conservative defaults, you know, because we knew actual operations weren't reflective of that. So we took that approach. But now we'll...

**Steve Jacobs:** We're going down a dirt road again.

**Rajiv Patel:** Right.

**Bob Gregory:** Steve, look at the sheet that just went out...

**Steve Jacobs:** No, I see it.

**Bob Gregory:** ...and look at collection efficiency. We assumed, to our detriment, a 9% collection efficiency. Across the board they were... Waste Management ACL, 70; City of Austin, 70; Sunset Farms, 95; Williamson County, 76. And you can see we changed ours to go to 45%. We had the basis to do that. And that's what we did. The same thing, the methane concentration, we were using 53%, which is a high number compared to the others. ACL was 46; 40 for the City of Austin; 51 Sunset Farms; and Williamson County 49. So based on all those assumptions you're doing and the oxidation factors and the efficiency, all of those things, every single one of our things stacked up to give the worst-case emission.

**Kaiba White:** Is it possible if you could focus your commentary on suggestions for how we can come to a formula? Like, I understand you've had this situation but like can we work on what formula we're gonna use?

**Bob Gregory:** Kaiba, I'm trying to show that there is a lot of variation in assumptions made.

**Kaiba White:** I think we're all here because we accept that.

**Bob Gregory:** Yeah. So, if we were to go the opposite direction and overestimate to the point that there are just no emissions whatsoever, that's the question...

**Kaiba White:** Right.

**Bob Gregory:** ...and I agree with Steve, how do you trust the City that they'll hire an engineer that is fair and all I know is there's a public process and we all have the basis to sit in a room like this and give comments on it and that engineer, somebody like Rajiv like they have at the City, they would say, 'Here's what I think is reasonable' and we would say, 'No it's not, because of this...' and we just argue it out because they are site specific and there is a lot of leeway.

**Kaiba White:** Right. So, I'm just wondering if you have the same site conditions as another landfill, whatever that other landfill is, you would hope you'd come to a similar calculation and conclusion, right?

**Bob Gregory:** Well you could...

**Kaiba White:** Is there are way that we can set this up so that that happens?

**Bob Gregory:** That's where a... that's what I'm wondering. Acknowledging the problems that Steve has pointed out, which I agree with, of the fairness of the third-party evaluator...

**Kaiba White:** Regardless of who does the evaluation.

**Bob Gregory:** ...but that third-party evaluator would evaluate why we figured what we did. They're not gonna say you were wrong to figure it high. They could easily say you're being over, and I don't know if the word 'conservative' means

you get high numbers or low numbers. But you, we could be too aggressive in our assumptions and so that evaluator would say, 'I think these are too aggressive. I think your numbers rightfully should be considered higher than that.'

**Brett O'Connor:** I'm just kind of spit-balling here, I want to see what everybody's thoughts are, but to help buffer out that age of site and gas system versus non-gas system sites, what if you looked at total emissions from day 1 when you started putting trash in that landfill until today, take those emissions and divide it by how many years of the life your site is. So say, I know staff said (*inaudible*) ...reported emissions, which was 2009. If you have from 2009 on we can easily say okay, we emitted this much, but before you didn't have to kind of calculate, where you can see, all right this site is a small site, it kind of buffers out the long-term effects and say okay I've been in ten years, I've emitted X tons of CO<sub>2</sub>, divide that by years and that's my emissions per year.

**Bob Gregory:** I think the real question goes back to are you basing that total emissions on what your chart or your flare said you were collecting and destroying? Or are you basing it on total waste in place? Isn't that the basic difference between the different systems?

**Brett O'Connor:** Well, it used to be before you had your gas system in place, you would have to assume base tons in place, I was emitting off this. But once you had... use either or you would have that information.

**Bob Gregory:** Well I think you can, but you have to acknowledge square meters of different kinds...

**Brett O'Connor:** You can do that, but I'm thinking okay, regardless of how we calculate, you know, the emissions, right, we just say, 'Okay this is our average emissions per year as per the life of site.' You know?

**Steve Jacobs:** The issue that Bob talked about earlier, some of the sites didn't have scales, so we're guessing. We also have, if we went that route, we have to factor in the methane generation curve, so waste material that was put in, we're seeing at our site. The older portions of the landfill are starting to produce less methane, which is a typical methane generation curve, so it gets even more complex. I think the simplest way is using the 8 method.

**Kaiba White:** I thought that you said that you knew how much waste was in your landfill.

**Steve Jacobs:** We do know how much waste is in our landfill.

**Kaiba White:** So do they. So who doesn't know that is in the mix here?

**Steve Jacobs:** That number, I think, is irrelevant because of the waste, the ton I put in there in 1980 is probably not generating enough methane to light a candle. It's just sitting there. So the waste I put in last year is generating more methane... (*inaudible*)

**Kaiba White:** So you're saying that the HH6 formula is flawed and doesn't account for...

**Steve Jacobs:** Well it's flawed, well It doesn't account for when the waste goes in, I don't think it has any factor for the waste in place.

**Brett O'Connor:** You can use the landfill model, right? You can put in, you know, 1980...

**Steve Jacobs:** We have a model we use that looks at it, and we have trouble with that one not adjusting itself for landfill gas so all our gas systems are over-engineered when you look at it.

**Brett O'Connor:** ...waste you put in 1980 is not generating less, (*inaudible*) you just put in the tonnage per year.

**Rajiv Patel:** Yeah, if you want to do that... like you put it in per year.

**Kaiba White:** Oh, the HH6 is per year?

**Rajiv Patel:** Yeah, you put it in per year.

**Bob Gregory:** There's still site specifics. I agree with those things by the way, but it's still site specific because if you're recirculating leachate and you're encouraging the more rapid degradation of the material and generation of gas because you want to produce more gas, that's a different landfill management system than one that is encouraging dry entombment, that their curve might rightly go twice as many years instead of a 30-year curve running, it may go 60 years to generate the same amount of gas. But it may take 60 years to produce what another landfill can produce much quicker.

**Brett O'Connor:** Correct me if I'm wrong, but there is a recirculation factor in the greenhouse gas category, right?

**Rajiv Patel:** Well it just asks if you do or don't.

**Brett O'Connor:** Does that give a higher weight? I mean, does that change it?

**Rajiv Patel:** No, yeah, it doesn't change it.

**Jason McCombs:** If we went with HH8, or HH6, am I hearing that would put anyone at a disadvantage?

**Chris Thomas:** Yeah. I think you'll have to. You're gonna have to use both models 'cause they won't have a collection system.

**Bob Gregory:** I think you have to use both.

**Jason McCombs:** You can choose those two.

**Kaiba White:** I guess I'm just wondering though, it's suggesting like especially if HH6 accounts for how much waste is going to the landfill when, and other operational practices, that that's probably getting a more accurate calculation of how much total gas is being produced, right?

**Brett O'Connor:** But the other one factors in the gas system.

**Kaiba White:** Right, right, I'm not getting to collection. How much total gas is produced?

**Rajiv Patel:** Right, but that one is like completely an estimate. It's basically, it's almost like just applying an emission factor. So you're just saying if you have this much waste, like, basically I've got an emission factor that says you have ten tons of emissions per ton of waste and you're just applying that to every landfill everywhere.

**Kaiba White:** HH6?

**Rajiv Patel:** HH6.

**Kaiba White:** And so it doesn't account for any composition of the waste kind of factors?

**Steve Jacobs:** Degradation factor.

**Rajiv Patel:** Yeah, just the degradation factor. You can get like a site-specific degradation factor based off of what the types of waste that you've taken in. So it does account for that a little bit and then...

**Kaiba White:** So if you're dumping more organics or less it doesn't change?

**Rajiv Patel:** It can. It can a little bit. A little bit. Yeah.

**Kaiba White:** Okay.

**Rajiv Patel:** But the biggest factor in that one is that decay rate, which everybody's using just this default decay rate that really kind of overestimates what your emissions would be from that landfill.

**Kaiba White:** What your emissions would be in that year?

**Rajiv Patel:** Just, in every year.

**Kaiba White:** I guess there's just, there's only so much carbon in any like, piece of material, right, so even if it's decaying faster than you're wanting it to, then it shouldn't have, like... Do you get what I'm saying? There's only so much gas that can be emitted from decomposing my body, which maybe some people would like to do here. You get what I'm saying?

**Rajiv Patel:** Yeah.

**Kaiba White:** Like there's, so doesn't the equation take that into account? So if it's decomposing faster then it's off your books faster?

**Rajiv Patel:** No, no, it's not that, it doesn't go quite into that level of accuracy. And that's the problem with that HH6 version. It's definitely like an overestimate. Like a conservative...

**Steve Jacobs:** The numbers are gonna be way higher.

**Rajiv Patel:** Way higher.

**Chris Thomas:** I don't think anybody at any of the landfills or people that have landfills think that HH6 is accurate at all.

**Rajiv Patel:** Yeah.

**Adam Gregory:** The only, it's my understanding the only landfill that uses HH6 is the City of Austin, the 812 landfill. I believe they do. Isn't that right?

**Rajiv Patel:** Yeah, yeah. One of 'em...

**Adam Gregory:** Everybody else elects to use HH8.

**Kaiba White:** So what's the purpose in asking for the amount of waste per year if it doesn't roll off at some point?

**Rajiv Patel:** I mean, it does. It does factor that into it.

**Kaiba White:** Okay.

**Rajiv Patel:** Like it'll... the equation does factor that into it.

**Kaiba White:** Okay.

**Rajiv Patel:** But it's just a matter of which equation is more accurate. I mean, HH8 is definitely the more accurate calculation of the two, you know. The only issue with, like we said, with HH8 is to make sure the surface areas are true to what's actually happening out at each landfill. That's it. That's the only...

**Kaiba White:** Well, we already have, of the three we have one that can't use HH8.

**Rajiv Patel:** Right.

**Kaiba White:** So I hope that our goal here is to come up with some solution that works for everybody.

**Chris Thomas:** They're gonna have to use a different... they're gonna have use a different (*inaudible*)... until they get a gas collection system.

**Rajiv Patel:** Yeah, I think that's just the way it is.

**Chris Thomas:** It's still coming up with an emissions number it's just theirs is gonna be overestimated for a little while.

**Rajiv Patel:** Yeah.

**Chris Thomas:** They're still gonna be emitting less than the other two landfills.

**Adam Gregory:** Should it simply be that you have the option of 6 or 8?

**Chris Thomas:** Yeah, I guess.

**Rajiv Patel:** Which is what the EPA allows. Yeah, the EPA allows you to do one or the other.

**Woody Raine:** Wasn't it that... *(inaudible)* triggers NSPS... *(inaudible)*

**Rajiv Patel:** Yeah, right.

**Brett O'Connor:** 34 mega grams a year of non-methane organic compounds.

**Rajiv Patel:** Yeah and that changed. It used to be 50 and then recently they dropped it down to 34. Yeah. Which, did that get... is that on hold or...?

**Brett O'Connor:** It was on hold.

**Rajiv Patel:** Yeah.

**Brett O'Connor:** But then they let it go and then it expired with everything else that was going on.

**Rajiv Patel:** Right. So once the landfill starts emitting that much NMOC, the non-methane organic compounds, then they're required to get that.

**Brett O'Connor:** So every five years, if you don't have a gas system, say it's a new landfill, right, every five years you gotta come in and do a Tier II test. They come in, plug a bunch of holes in your landfill, sample the gas. You get what is that non-methane organic compound emission rate. Once you hit 34 mega grams a year then it starts the clock until you have to have a gas system in place. So you have 12 months to get TCEQ a gas system design plan and then after that 12 months then you have 18 months to get that gas system installed.

**Woody Raine:** Is there any value in differentiating between landfills that are affected and not and how they're measuring... *(inaudible)*

**Brett O'Connor:** I mean, you could theoretically put advantages on sites that are regulatorily required to have a gas system in place, put the, at an advantage over smaller site that doesn't have it in.

**Kaiba White:** Well, it seems like they do have an advantage in that they can choose this more beneficial equation, right?

**Brett O'Connor:** No, because that's a different animal. What we have to do every year is report the greenhouse gas emissions. The greenhouse gas emissions have nothing to do with having to have a gas system in place. It's the non-methane emissions that trigger having to have a gas system in place.

**Jason McCombs:** Okay, so we've got two, I think, imperfect systems.

**Rajiv Patel:** Right, right.

**Bob Gregory:** They are imperfect systems. They are.

**Jason McCombs:** Okay, it would be a good idea to choose between the two. Those are gonna spit out, kinda help me understand, it's gonna spit out two different numbers. Are the numbers similar enough that they can be scored, you know, one landfill chooses to use the HH6, one uses the HH8, even though they're imperfect, we're still getting a number out of them. Can those numbers be compared and scored in any way comparatively? And how would we plug that in?

**Bob Gregory:** So are you recommending perhaps all landfills do both methods and submit both of them?

**Jason McCombs:** No, I'm saying have a choice...

**Rajiv Patel:** You choose.

**Jason McCombs:** That's just an idea. Let's say you choose HH8, landfill B chooses to do HH6...

**Rajiv Patel:** Basically what you end up reporting to the EPA.

**Jason McCombs:** Yeah, so you guys, the alternative part of the scoring for this matrix, you turn that in. You know, now we have two scores that we have to score somehow on this matrix, are those numbers comparable enough to be able to score?

**Bob Gregory:** I don't know. Are you a gas guy?

**Brett O'Connor:** I'm a jack of all trades.

**Bob Gregory:** Yeah, me too.

**Chris Thomas:** He hires our gas guy.

**Brett O'Connor:** Yeah I hire your gas guy.

**Rajiv Patel:** I mean, in theory they're supposed to be comparable. In theory they're supposed to be giving you the same number, you know.

**Kaiba White:** That's a percentage right? That number?

**Rajiv Patel:** No, no. It's just pounds of emissions.

**Bob Gregory:** How do you say in theory they're supposed to get the same number? How could they possibly get the same...?

**Rajiv Patel:** Right. Right. They don't.

**Adam Gregory:** They're trying to say the same thing.

**Rajiv Patel:** They're trying to say the same thing but they're just taking two completely different approaches to get to it.

**Bob Gregory:** Okay.

**Rajiv Patel:** And so that's why you end up with the two different numbers.

**Kaiba White:** And so for HH8, the number that comes out is including the areas that basically aren't covered by the system, so those might be leaking directly out, and then the collection efficiency of the areas that are being collected by the wells, and then the CO2 resulting from burning that methane off.

**Rajiv Patel:** Yeah.

**Kaiba White:** *(inaudible)*

**Rajiv Patel:** Well, yeah, right.

**Kaiba White:** Okay.

**Rajiv Patel:** And basically all that just gets converted. You convert all that to CO2 equivalents and that's what gets reported. Yeah.

**Kaiba White:** So you end up with tons and then I think where we actually were at in our last conversation at our last meeting was then converting that to something that accounts for the different size of the landfills, right, so that it's not just giant landfill with a large tonnage number compared to a tiny landfill with a small tonnage number, right?

**Brett O'Connor:** So would you give a, to make all things equal, a site that isn't required to have a gas system in place, would there be some type of reduction factor to bring it to an even playing field with a site who has a gas system?

**Kaiba White:** I don't think the requirement should be the issue. It should be your tons in place, maybe. Does that work?

**Rajiv Patel:** Well I think that's where last week we came out on dividing by the tons in place, so basically...

**Brett O'Connor:** It already factors that in though.

**Rajiv Patel:** It factors it in to come up with the emissions number but then I guess you're trying to normalize it to this is your emissions per waste taken in, per ton of waste or whatever. Right?

**Brett O'Connor:** Yeah, so emissions that it says you give off, based on the tons you take in place.

**Rajiv Patel:** Right, right.

**Kaiba White:** Right.

**Adam Gregory:** It's just working forward and back.

**Brett O'Connor:** Yeah.

**Rajiv Patel:** A little bit.

**Brett O'Connor:** Side to side.

**Alfonso Sifuentes:** Again, you know, our opinion is, be careful penalizing because being a new site, I would think it's a great prospect for the City of Austin to take their waste, right? It's a brand-new facility and all the infrastructure is in it to be able to accommodate so, again, we're gonna have to find that type of balance but I don't think penalizing us in some way I think is just not...

**Kaiba White:** Right, and we're not talking about penalizing I'm saying...

**Bob Gregory:** It'll take a while.

**Brett O'Connor:** Well it's not penalizing, but it's essentially favoring one...

**Adam Gregory:** It's just, I mean, the natural progression is real low, low, low and then you get higher until you put a gas system in and you go down. So that's... there will be a time period when a new landfill is low and then they're higher and then they're back low again. So I don't know that we need to, since, like Steve said the ultimate goal of measuring, is trying to get an idea of the actual emissions, you let people, you expect for everybody to follow that path, and they do.

**Steve Jacobs:** And I think that's the point that if greenhouse gas reduction of emissions is a key criteria for the City, then a new facility has to be able to make their decision whether they want to roll the dice or put in a gas system well ahead of time.

**Adam Gregory:** Yeah. If it incentivizes early installation of a gas system, all the better. Which is what you'd like, yeah.

**Steve Jacobs:** I don't think you do anything different for him. Matter of fact, I think we should punish him for sailing into a sales speech right in the middle of a technical session. It should be a red card at least.

*[laughter]*

**Alfonso Sifuentes:** I love it.

**Bob Gregory:** Welcome to the landfill business.

**Alfonso Sifuentes:** I feel welcome now. I feel at home now.

**Chris Thomas:** I don't think it needs to be divided back...

**Adam Gregory:** Should it be a choice?

**Chris Thomas:** Here's how many pounds you emit every year, that's it.

**Rajiv Patel:** And just leave out, let that be your normalized number.

**Chris Thomas:** That's it. That's the number. Because it takes all of those things into account in a roundabout way.

**Adam Gregory:** Okay.

**Kaiba White:** That's definitely gonna give an advantage to a small, new landfill.

**Chris Thomas:** Up until a certain point.

**Chris Thomas:** It could really penalize them for a few years.

**Rajiv Patel:** Yeah, right up until the point... yeah.

**Adam Gregory:** There's a lot of other factors that they'll consider, that Council ought to be considering on a case by case basis. You know, distance traveled and things like that, so this isn't the only thing...

**Kaiba White:** Sure... the matrix.

**Alfonso Sifuentes:** The matrix, too.

**Rajiv Patel:** Which is true, maybe that's kind of what you want, where the smaller landfills once they get to that point where their emissions are up here and they're getting close to needing that gas collection system, maybe that'll be the time where they're like, 'Okay, it's time to put that in.' Which is maybe what you're trying to drive anyway.

**Kaiba White:** Yeah. I guess I'm not quite understanding why you wouldn't want to normalize this by the size.

**Bob Gregory:** Say it again?

**Kaiba White:** Why would you not want to normalize this factor to account for different sized landfills, even if you were all the same age? One is 100x larger...

**Bob Gregory:** Given site specifics, I think you can make multiple arguments for and against different conclusions. But yeah, that's hard to argue against what you just said, but it depends on the site specifics.

**Kaiba White:** Sure, you mean in the calculation. So I think we're at the point where I think we concluded that choosing your equation from the 6 and 8 option, right, and then those give you a number for total emissions. And I'm saying if you have two landfills and they're both in year 5, they're both in year 20, whatever, they're both in their same year of operation, but one is tiny and the other is huge, they are going to have dramatically different values come out of those equations.

**Bob Gregory:** They should.

**Kaiba White:** And wouldn't we want to normalize to account for the differences?

**Steve Jacobs:** But if we're going back to the goal is to minimize greenhouse gas emissions, how do you do that? Because the reality of it is, the bigger landfill has more greenhouse gas emissions.

**Kaiba White:** Yes, but the solution should not be breaking that landfill into a hundred tiny landfills. That doesn't actually reduce emissions, right? And I'm not saying that anybody's gonna do that but I'm just saying that that mathematically would work if we don't normalize.

**Steve Jacobs:** I understand what you're saying, I just don't know how you come up with a formula that does that, where it normalizes. Because they're no way you can... I guess you could pick a number and divide it...

**Adam Gregory:** To normalize you're either going to ignore some emissions or penalize for lack of emissions.

**Kaiba White:** Why does dividing by your tons in place not do it?

**Adam Gregory:** I don't know.

**Ryan Hobbs:** We've already established that up until a certain period of time people were using a default average for the annual tons.

**Kaiba White:** Right, but these guys do have their tonnage numbers.

**Ryan Hobbs:** Aren't they using an average per year up until 2009 to estimate the waste in place from 1970 til 2009?

**Kaiba White:** Y'all don't know your tonnage in place, is that what you're saying?

**Rajiv Patel:** No, we do.

**Kaiba White:** Okay.

**Rajiv Patel:** Yeah, we do.

**Bob Gregory:** However, let me ask you a question. Don't some landfills use an average or default amount by the way it turns out to be? But the years that they're using that default are not necessarily the years that waste came in. So theirs might start for 1999 whereas the landfill took waste 20 years, the prior 20 years for that. So it doesn't necessarily account for what was in place, or it doesn't account for what was in place prior to '99.

**Rajiv Patel:** Right.

**Bob Gregory:** So, and all waste is not created equal to a certain extent. If one takes a large amount of sludge and that's wetting the garbage, generating more gas, that's different than a landfill that doesn't hardly take any sludge. The type of daily cover, whether it's alternative daily cover or clay soils. There's a lot of site specific related to that sort of thing. What type, what was the waste? Is it a very wet waste, is it more of a regular garbage, which has moisture in it, no doubt, and yard waste has a lot of moisture in it, leaves and grass. Stuff like that. So there's situations that, again, help your argument. I agree, total waste in place should matter. However it's not the only thing.

**Woody Raine:** These criteria are based on incentivizing the landfills to improve their performance from year to year, whatever, do the best they can and I'm wondering how that might affect how we look at this and what you handed out about the collection efficiency for TDS. The number has gone up, they got to the point where we can do better than we've done in the past. It seems like collection efficiency is a number that has a lot of value and is parallel to a lot of the other systems.

**Bob Gregory:** Actually, TDS did the exact same thing. We only did what we did. Your history is your history. It just so happened we used assumptions that were different. That changed nothing on how we operated. It was just the way the assumptions reported the well spacings, whether it was 9% collection efficiency or 45.09 percent.

**Woody Raine:** You'll be adding more wells and that will capture more in your efficiency and your percent emissions...  
(inaudible)

**Bob Gregory:** I think from Kaiba's argument it's to encourage people to do things differently in the future, not necessarily what they did in the past.

**Woody Raine:** Right.

**Bob Gregory:** If we took lots and lots of sludge, we're not paying for it now, so to speak, but we might do things different to allow for the added, more accelerated generation of gas than had we not taken sludge or any other landfill. So, to me, I, again, recognize and agree with what Steve has said on behalf of Waste Management that it's how do we get comfortable with a third-party evaluator selected by the City, but I think somewhere, someway, whether there's an evaluator or not, we, the landfills, are gonna argue our case that this is why ours should be seen as positive rather than a negative. And I guess we'll just have to do that with or without a third-party evaluator.

**Steve Jacobs:** And it could be if the evaluation is what percentage or what square meters of your landfill has final cover and what has intermediate cover it could be that we present it with a certified document from what a consultant that we choose.

**Bob Gregory:** Oh, and I think we should do that.

**Steve Jacobs:** I keep going back to this and I know what you're trying to do with making it fair but if the criteria is greenhouse gas emissions I don't think you should normalize it for a new site. They're gonna have a generation curve. Their number's gonna climb up. When they get up to the point where it's starting to be an issue on their scorecard, then they have a decision to make. Do they want to put a system in? It's relatively inexpensive to put in a non-regulated gas control system. Or do they want to just ride it and see how far they can go? If you try to do the math to make it fair for a newer site or a smaller site, you confuse the whole issue even more, I think.

**Kaiba White:** I just, I don't know, to me it seems like comparing emissions from a car to a bus. The car is carrying one person and the bus is carrying 30. Like, you don't look at those the same.

**Steve Jacobs:** But if the criteria is the emissions...

**Kaiba White:** Right, but it matters what we're getting out of the emissions as well.

**Alfonso Sifuentes:** I thought we were trying to measure the efficiency so it's whether you use a car or a bus, it's which is more efficient, regardless of the size.

**Kaiba White:** Right and so you wouldn't compare them apples to apples. You would divide the emissions from the bus by the 30 people.

**Alfonso Sifuentes:** I think that's what we're saying. That's why we've got two different, HH6 versus HH8.

**Kaiba White:** Are you saying HH6 is going to account for difference in size in some way?

**Alfonso Sifuentes:** Well, to be honest with you, I'm not too familiar with HH6 but from what I'm hearing it's more favorable given that it's all based on estimations right, I mean, and that's all we can do right now is basically estimate. There are some variables that we can be, like the acceptance of tonnage waste which is all reported to TCEQ. There are some variables that are be concrete but there are gonna be some estimates that we'll have to use some defaults in.

**Kaiba White:** Right, and I'm talking about after you've gone through the equation. You've used the HH6, the HH8, and now we're looking at these three numbers because they also used HH8 probably, and we have three numbers. How do we compare them?

**Alfonso Sifuentes:** That's the question.

**Rajiv Patel:** So what Kaiba's saying is everyone's, say Waste Management has one number, TDS will have one number, you guys will have one number. You're saying just divide that same number, everyone by their waste in place and get a tons of emissions...

**Kaiba White:** We have to have some way of comparing a car to a bus that is fair.

**Steve Jacobs:** We can look at that. I mean, we'll probably still be in these meetings and he won't be open for a couple more years so he can adjust it.

**Alfonso Sifuentes:** Well, we could definitely bring in engineers.

**Steve Jacobs:** I would have to look at it. I don't know how that would work.

**Bob Gregory:** I don't know either. I think...

**Chris Thomas:** What we're gonna do is just going to water down those emissions. It's just such a big, talking about tons in place, that both of the facilities that are open. That's a significant amount of tons and it's just gonna water down that number. It's gonna be so small.

**Bob Gregory:** I think that's exactly right. I think you might have to do it, you might have to calculate it and say does that seem reasonable. We're gonna have to give a reasonable tests here because there's gonna be circumstances whether it's the large number of tons that made it seem totally unreasonable, or whatever, it's gonna be a process, there's no question.

**Chris Thomas:** Well, is it out of the... when is the next meeting, in another week or so, is there a reason why we can't...

**Bob Gregory:** A week from today is the next...

**Chris Thomas:** ...take your numbers from last year and divide it by how much waste you have in place and just come to the meeting with a number and let's see what it looks like?

**Bob Gregory:** We could.

**Chris Thomas:** They're publicly available numbers and we know yours is zero.

**Alfonso Sifuentes:** But I can definitely extend an invitation to one of our engineers to explain the designs and things that we have in place to be able to, to Adam's point, we're gonna follow that bell curve, you know, and...

**Chris Thomas:** You can give an estimation of three to five years down the road what yours is gonna look like. Three to five years down the road when you're open, get your number and see what...

**Adam Gregory:** If you guys get volume... I'm just kidding.

**Bob Gregory:** You've assumed in the permit certain volume so just take whatever that is and it's what, 50 year life or something, I don't know what it is. Yeah, we could do that. We have no problem. And while the numbers are published from EPA, we've given you what the revisions were on March 1<sup>st</sup>. So while they're not published, the EPA has not yet put them on their website yet.

**Jason McCombs:** Okay, so what I'm hearing is the idea is that the landfill operators can choose between HH6, HH8. They'll be evaluated ideally by a third party that would then provide (*inaudible*). We'd be looking at total emissions divided by the waste in place. That came out of this report. Does that sound...? And everybody's gonna take this back, run the numbers and see if that is reasonable and works...

**Bob Gregory:** What I hear is we're heading to agree on that we can choose between the two systems, but to do an exercise on the total emissions divided by that, to continue the discussion before. Is that right?

**Chris Thomas:** I don't want to muck up. There's enough to do in that meeting but we should probably not muck that meeting up talking about this. So before or afterwards and just sit down and take a look.

**Bob Gregory:** Sure. Either way.

**Adam Gregory:** I think that the option between 6 and 8 is probably where we want to land. I think a lot of people are gonna feel uncomfortable about, maybe, is the verification aspect and how you do that. I actually like the idea Steve came up with an engineer certifying your square meter report because that has such a, that has a lot of implications.

**Rajiv Patel:** Right.

**Bob Gregory:** And total tonnage.

**Adam Gregory:** Just the square meters.

**Bob Gregory:** Oh, just the square meters? Okay.

**Adam Gregory:** Yes, the square meters. So that could go a long way towards at least having something to verify.

**Steve Jacobs:** Yeah, it's better than driving around going, 'That looks about 95% covered.'

**Bob Gregory:** Is that what you were referring to with certified statement from an engineer?

**Steve Jacobs:** For the coverage percentage.

**Adam Gregory:** Yeah, he was talking about A1...

**Bob Gregory:** The bottom section there.

**Steve Jacobs:** Yeah, where you have the... 'cause that changes the effect of just having...

**Bob Gregory:** A1 through A5.

**Steve Jacobs:** Just have a non-affiliated third party that verifies it.

**Bob Gregory:** Yeah.

**Andy Andrasi:** How are those points going to be allocated to that? Percent? X number of points? 72, X + ...?

**Adam Gregory:** It kind of works against the way the plan for scoring was when you were looking for the highest number and now you're looking, wanting to reward the lowest number because you had planned on using a percentage number, and we've gotten to where it's going to be the opposite, so we've got to, and I think that's what you're getting to.

**Andy Andrasi:** What the applications are and how you're going to apportion...

**Ryan Hobbs:** Distribute the points.

**Woody Raine:** There's a method in solicitations where they award the lowest priced item in an RFP with the highest points and then distribute fewer points to those that had higher costs.

**Andy Andrasi:** Right, but how do you determine what the next level of point allocation is? Certainly whoever has the best score is gonna get the most points but then how do you...

**Adam Gregory:** Then you go, you take, say that number 2 was a certain percentage of that number and then you get that percentage of the points.

**Richard McHale:** Just like you do for price.

**Adam Gregory:** Yeah.

**Andy Andrasi:** And that would only apply if it came to a one unified equation.

**Bob Gregory:** There's got to be a scoring criteria.

**Chris Thomas:** It would be that same number, pounds of CO<sub>2</sub>. So it'll spit out the same number it's just gonna be got to it in different ways. You can get a number so you can compare every landfill whether it's open for a year or 60 years. You're gonna get one number. It's gonna be the same number as everybody else is, it's just gonna be higher or lower.

**Adam Gregory:** And if the lowest one got five, had five pounds and the next lowest had ten, then the lowest would get all 20 points and the ten would get half the points.

**Andy Andrasi:** I'm just saying there has to be a methodology in place...

**Adam Gregory:** Absolutely.

**Andy Andrasi:** ...so that it's not subjective... *(inaudible)*

**Bob Gregory:** I think it's gonna have pretty much a scoring criteria just for this item and if you use alternative daily cover versus clay cover that'll be a different, that'll be a portion of the evaluation, not just all-in on one number. Unless you're gonna do a pass/fail deal which is maybe where this was started out, being a pass/fail. I think we ought to run some examples and see if it's even reasonable.

**Kaiba White:** So, as we were thinking or talking about this and normalizing, it did occur to me that accounting for tons in place that have fairly completed their off-gassing process doesn't probably make sense and I don't know where that cutoff is. If anybody here knows what that curve looks like and where we're nearing zero on that curve, I would suggest that maybe that should be a modification to what we just talked about, that those tons that are essentially inert by that, whatever that year is, you don't account for that tonnage in place so that you're not *(unclear)* that factor by tons that clearly are not contributing to that overall number that was calculated with either the HH6 or HH8 number.

**Andy Andrasi:** So do you back out the C&D numbers?

**Kaiba White:** I mean, that's why I was suggesting that if we could combine these two formulas we could account for that kind of thing, but it seems like there wasn't interest in doing that.

**Bob Gregory:** Kaiba, it's gonna count... it's gonna depend on the waste, whether it's a high – like lots and lots of biosolids sludge that's included within the garbage, whether it's a lined cell or not lined cell, because wet, you know, you can have a totally saturated situation and there's hardly gonna be any gas produced. You can have one that's more – a bioreactor landfills that have a lot of leachate recirculation is gonna produce, their curve is gonna look very different than one that is a dry entombment. It would be good for everybody to see, and maybe it's something that some engineers can do a little bit of a presentation on the installation of gas wells. Because in some landfills you're digging into very old, mature waste that's coming up. It hardly has any gas in it whatsoever. In some landfills you literally can dig up 25 years ago waste and unfold and read the newspaper. It's not even necessarily wet. It's just dry entombed. Which means its gas cycle has not hardly even started, let alone being completed even though it's been in place 25 years. Portions of the waste, the food waste and the yard waste and the wet portions of it, they will biodegrade much quicker than totally dry because you've got to have oxygen, not for anaerobic, but you have to have certain conditions met. So really, part of that depends on the circumstance within that landfill.

**Brett O'Connor:** So did we say that we were gonna do the total emissions and divide that by the tons? Is that what we were doing?

**Kaiba White:** Tons in place.

**Bob Gregory:** That's an exercise we're gonna go through.

**Adam Gregory:** Tons in place or annual?

**Woody Raine:** Well, would you look at that or would you look at cubic yards of waste? Rather than...

**Bob Gregory:** If you get, you have to get the cubic yards to get the tonnage for an old landfill because if they didn't weigh their garbage coming in, you can't weigh the landfill. So all you have to figure is the cubic yards and then based on certain assumptions, calculate.

**Brett O'Connor:** You'll have cubic yards for everything... *(inaudible)*

**Bob Gregory:** You will have cubic yards if you know the bottom of the landfill, where that is.

**Brett O'Connor:** Yeah, most should.

**Bob Gregory:** But if you're using daily cover that's clay you may have 18% to 28% daily cover too and that's not waste, as you know. That's cover that's beyond... daily cover, soil daily cover takes up a lot of space.

**Kaiba White:** So could you do total cubic yards minus the cubic yards that are daily cover?

**Bob Gregory:** Of cover, yeah.

**Brett O'Connor:** What if you don't know...?

**Bob Gregory:** You make allowances for it. If you're taking in 4,000 tons a day and your waste is 14 feet deep, your waste compaction, versus you're taking 200 tons a day and it's four feet.

**Brett O'Connor:** Factor in how much... *(inaudible)*

**Bob Gregory:** Yeah, but that's an assumption that's site specific. If you're using mostly alternative daily cover, which you have to cover every so often anyway, then it's gonna be a different assumption for waste space used by soil, than if it every day is covered, daily clay, or soil.

**Jason McCombs:** Okay. So I think what we're gonna do is we're gonna run this exercise and talk about it next meeting. I do want to touch a little bit on the 1B, which was the onsite use of carbon-free fuel and I know at the last meeting we talked about changing the scores a little bit. I think we did it 10, there was a proposal to bump it down to 5, if I remember correctly. How's everybody feel? I know we talked about combining these.

**Chris Thomas:** My two cents, that is maybe to make somebody feel good. It's not gonna have any impact on the total emissions of the site. Not even if every piece of equipment was an electric compactor and dozer, the amount of emissions that you emit on the site based on the waste that's in place is gonna have... it's just a number.

**Bob Gregory:** It is very misleading and one landfill that has one compactor with the same amount of tonnage versus another one that has two compactors, they would have twice the emissions but they get far more compaction and taking up less space.

**Chris Thomas:** It's gonna have so little of an effect on overall emissions.

**Kaiba White:** I think that's a good point and the point of adding that in the matrix is to encourage adoption as new equipment becomes available, so while I do hope that the number that is reported can include a total emissions number, I don't think that that needs to be how the matrix is laid out.

**Brett O'Connor:** Yeah, so that's like the greenhouse gas, they ask for trucks... *(inaudible)*... that's already in the greenhouse gas emissions calculations already.

**Kaiba White:** You're saying it's in...

**Brett O'Connor:** It's in that 1A, the factoring of the vehicles that you have onsite.

**Bob Gregory:** Is that factored in 1A? Really? Do we factor that in, Rajiv? The compactors?

**Rajiv Patel:** No.

**Woody Raine:** Are you talking about landfill gas used?

**Chris Thomas:** Greenhouse gas...

**Brett O'Connor:** Yeah, whenever I send in my information they ask for vehicles that I have onsite and so on and so forth, so...

**Bob Gregory:** But it's not calculated in your report.

**Rajiv Patel:** Not in these equations, right.

**Chris Thomas:** Are you talking about greenhouse gas emission?

**Rajiv Patel:** Yeah, that must be something else.

**Woody Raine:** The beneficial use of the landfill gas that produces energy to fuel a vehicle or something like that, it's in a sense another carbon offset, should that be factored in?

**Chris Thomas:** It's somewhere else in the matrix.

**Woody Raine:** It's 2B, and I'm wondering whether that's a significant enough carbon footprint reduction that it could be combined so that you're displacing a carbon based fuel when you're generating electricity from a landfill gas collection system.

**Bob Gregory:** That's the question. From a scoring system, what do we give weight for that, what do we give weight for the equipment that's operated. We don't have, like Steve has pointed out, we don't have electric compactors yet, so...

**Woody Raine:** *(inaudible)* ...to generate electricity.

**Bob Gregory:** That's a different deal.

**Woody Raine:** Or plug it into a natural gas line and fuel your own vehicles. In all those cases you're displacing a natural, so to speak, source of methane. And that's a carbon benefit. That's a carbon footprint reduction. Now whether that's a big number or not...

**Adam Gregory:** Well there is kind of a catch-all for carbon offset activities in the matrix as well. So it's verifiable and measurable things and maybe that fits, you could plan to fit that...

**Woody Raine:** *(inaudible)*

**Adam Gregory:** ...no, not H8, it's in the criteria that we're working on. There's a catch-all for carbon offset activities.

**Bob Gregory:** That's in the different, on number 1. Isn't that on number 2? I don't have that. It's one of the ones under number 2. Yeah.

**Woody Raine:** It was originally number 1 because...

**Adam Gregory:** Yeah, 'the landfill may provide information on offsite carbon offset projects that meet accepted protocol for validating, measuring and monitoring.' So would a switch to...

**Kaiba White:** Separate from 2B, which one are you looking at?

**Adam Gregory:** That's in 2B.

**Woody Raine:** I guess originally... those are separate decisions by a landfill, is that right? And if Kaiba or the City Council wanted to measure the carbon impact of delivering material to a particular landfill they could take numbers from both of those measures, I guess.

**Bob Gregory:** So the question goes do we move 2B to 1 to make it part of that 20 point deal?

**Woody Raine:** That's part of it, yeah.

**Bob Gregory:** Or take out part of the landfill operation? Isn't 2 Operation?

**Woody Raine:** 2 is Sustainability.

**Ryan Hobbs:** Move it up. 2B up.

**Adam Gregory:** I think it would be better to put that into Category 1 so you have more points to allocate throughout the Operation section, which is very important.

**Bob Gregory:** So what of 2B is not part of the gas collection?

**Adam Gregory:** Maybe 1B goes away and 2B replaces it.

**Ryan Hobbs:** 2B replaces it.

**Kaiba White:** I don't think 2B should go away.

**Adam Gregory:** No, 2B.

**Kaiba White:** We could just add it...

**Adam Gregory:** Yeah, we were saying how...

**Chris Thomas:** Or move it into 2 and add it to the Operation section and give it some points to get a little extra credit for using an electric vehicle onsite. It's not gonna have a big impact on your emissions. 99% of the gas comes from a landfill.

**Kaiba White:** Right, so we're not... I've given up the idea of trying to have one number.

**Chris Thomas:** You should get some kind of credit for having an electric vehicle...

**Steve Jacobs:** If they existed, sure.

**Jason McCombs:** So the proposal is to move 1B, is it to Operations, is that what I'm hearing?

**Kaiba White:** No.

**Adam Gregory:** No, move 2...

**Kaiba White:** 2B back up.

**Adam Gregory:** Move 2B back up into the 1 section.

**Jason McCombs:** Okay.

**Kaiba White:** And I was the one who suggested moving it down and I'm fine with that. The reason I was trying to get it out of that section was because I was thinking if we could have all this 1B be down to one number that would be helpful but I've been persuaded.

**Bob Gregory:** So, I'm sorry I don't have my notes with me. What is 2B? Is that...

**Adam Gregory:** 2B is beneficial use of landfill gas beyond flare.

**Bob Gregory:** Oh, it's totally tied to landfill gas, it's not other things? Whether it's composting or whatever?

**Adam Gregory:** It's a catch-all for carbon offsets.

**Kaiba White:** Yeah I think we could rename that...

**Ryan Hobbs:** Here's 2B. See the measure right there?

**Adam Gregory:** Yeah. Y'all name it whatever you want but the idea is that it puts your gas beneficial reuse beyond flaring, beyond destruction, along with other carbon offset activities that are verifiable.

**Bob Gregory:** Well I think 2B needs to be in 1.

**Ryan Hobbs:** Yep.

**Adam Gregory:** That's what we're doing.

**Bob Gregory:** I'm just telling you now that I've read it, there's no place...

**Steve Jacobs:** Old people are fun, aren't they?

**Bob Gregory:** You should know, right?

**Jason McCombs:** I think it's, this will be like, I want to say, 1C now. The 2B will become a 1 so it will be A, B, and C. Right?

**Andy Andrasi:** Because last meeting we changed the points on 1B down to 5. So if you're moving 2B into that, 1B and 2B would be 5 points.

**Adam Gregory:** Should we go, I mean, last week, should we do the scoring, the weighting and stuff? Should we save that?

**Ryan Hobbs:** Yes.

**Adam Gregory:** Because I think we've achieved a lot by getting it up there, we've achieved a lot. Let's not mess it up.

**Steve Jacobs:** We'll do that next week.

**Adam Gregory:** Yeah, we'll mess it up next week.

**Jason McCombs:** Okay, so...

**Steve Jacobs:** Sum that all up.

**Jason McCombs:** In summary we're going to do an exercise calculating the total emissions between HH6 and HH8, divided by tons in place, see what those numbers look like, how they look. We're going to move 2B up to 1 so there's now a 1A, 1B, 1C.

**Adam Gregory:** Yeah, and we'll deal with the points later. Congratulations, you guys.

**Richard McHale:** We finished early, too.

**Adam Gregory:** Did we?

**Ryan Hobbs:** Can we take the unused minutes and apply them to the Monday meeting? We're gonna need it.