

From: [Ardizzone, Chuck CA](#)
To: [Gray, Lesli](#); [Polk, Jonna E](#); [Willey, Seth](#)
Subject: Re: Does the attached SpaceX BP need any updates
Date: Friday, April 28, 2023 10:12:24 AM

Tweaked the one bullet a little

- Impacts from the launch are being examined by FAA and USFWS and may lead to reinitiation of the consultation

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From: Ardizzone, Chuck CA <chuck_ardizzone@fws.gov>
Sent: Friday, April 28, 2023 11:49
To: Gray, Lesli <lesli_gray@fws.gov>; Polk, Jonna E <jonna_polk@fws.gov>; Willey, Seth <seth_willey@fws.gov>
Subject: Re: Does the attached SpaceX BP need any updates

Seems like we should add something about the recent launch and anomaly, maybe something like this. See below Chris Perez's notes and an a recent article on the launch.

- On April 20, 2023 SpaceX conducted a rocket launch from it's facility in Boca Chica, Texas. An anomaly occurred resulting in the destruction of the rocket.
- FAA is currently conducting an investigation of the anomaly
- Impacts from the launch are being examined by USFWS and may lead to reinitiation of the BO

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From: Perez, Chris <chris_perez@fws.gov>

Sent: Monday, April 24, 2023 10:23

To: DeLaGarza, Imer <Imer_DeLaGarza@fws.gov>; Perez, Sonny <sonny_perez@fws.gov>; Lueders, Amy L <amy_lueders@fws.gov>; Reagan, Steve <steve_reagan@fws.gov>; Gardiner, Dawn <dawn_gardiner@fws.gov>; Ardizzone, Chuck CA <chuck_ardizzone@fws.gov>; Polk, Jonna E <jonna_polk@fws.gov>; Bossert, Dean <dean_bossert@fws.gov>

Cc: Orms, Mary <mary_orms@fws.gov>; Bilodeau, Stephanie A <stephanie_bilodeau@fws.gov>

Subject: Bullet points and quick summary of our site assessment of post launch impacts from SpaceX on April 20, 2023.

FWS Wildlife Biologist, Stephanie Bilodeau, and Willy Cupit from TPWD, as well as myself first visited the impacted area on Saturday April 22nd. We were not allowed in for more than 48 hours due to safety concerns from the extensive launch pad impacts. Large concrete chunks hurled thousands of feet away most apparent at first impression overall. One chunk with rebar measuring 47 inches x approximately 12 inches was found in the tidal flats over 1,000 feet away. On the north side a large area of white powdery coating which I believe is pulverized concrete blanketed the tidal flats. This I believe was part of a plume which deposited that powder all the way to Port Isabel. No dead birds were found in any of the areas we searched. Concrete chunks were distributed all over the tidal flats along with impact craters; some of which were more than a foot deep. The furthest concrete chunk was found about 2,680 feet away from the pad site. Concrete chunks and rebar were scattered on the beach east of the launch pad. One snowy plover actually remained on the nest, even during the launch as captured by our wildlife cam set up the night before. This nest was 4,224 feet from the launch site. Another bobwhite quail nest of 7 eggs was lost in the fire along with several blue land crabs.

- Total areal extend of the debris field was determined to be 385 ac.
- Coordination and cooperation with SpaceX was adequate except that access to the site was delayed by more than 48 hours due to pad safety concerns.
- The debris field exceeded the area delineated on Figure 27 of the May 12, 2022 Biological and Conference Opinion 02ETCC00-2012-F-0186-R001.
- No debris was documented on refuge fee-owned lands. All debris located on SpaceX and Boca Chica State Park lands.
- A 3.85 ac fire started south of the pad site on Boca Chica State Park lands.
- Sound level readings collected by a university researcher measured 144db at 2-miles from the pad site.
- Plume cloud deposited what we believe is pulverized concrete as far away as Port Isabel, 6.5 miles to the NW of the pad site.
- Concrete chunks up to 7-inches in size were found as far as 2,680 feet from the pad site.
- No dead birds were recovered.
- Our 3 temperature loggers did not detect significant changes in ambient temperature during

the launch. These sensors are placed between 1,456 feet to 3,050 feet away from pad site.

- We need to have a follow up meeting with FAA to discuss post launch event. One question we had for FAA is what are there licensing requirements for the launch pad and does that undergo consideration to ensure it is adequate to handle the launch vehicle/booster?

[Sent from Yahoo Mail for iPhone](#)

Begin forwarded message:

On Wednesday, April 26, 2023, 12:53 AM, ESG Hound <esghound@substack.com> wrote:

[Open in app](#) or [online](#)

SpaceX's Texas Rocket Caused a Big Mess - What's Next?

ESG HOUND

APR 26



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Well, this has certainly been a wild week. [Last Sunday, I posted a summary](#) of some key environmental impacts to look out for during SpaceX's first launch of Starship Superheavy from Boca Chica, Texas. The post did really well in the following days; it racked up a view count in the ~25k range, a big success for a Substack like mine.

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Last Monday, SpaceX scrubbed the first launch attempt at the last minute due to a technical issue. On Thursday, April 20, they tried again and launched the largest rocket in human history.

[David Willis, Space Scout](#)

The Super Heavy Starship made it several miles above the launch pad, struggling at times as several engines failed and some apparent fuel and hydraulic issues presented themselves at the great vessel's base. [As is well reported, the second stage Starship failed to separate](#). The entire craft spun out of control for about one minute before being self-destructed by the internal Flight Termination System (FTS).

[SpaceX, and CEO Elon Musk](#), immediately declared the mission a success since the incredibly low bar of not blowing up on the pad had been surpassed. NASA administrator [Bill Nelson Tweeted approvingly](#), and several bloggers declared the mission a successful first try, yielding great data.

I'm not a rocket scientist, so I'll save the commentary on the value of iterative development for others.

But the immediate claims of "MISSION SUCCESS" rang hollow nearly immediately as it was abundantly clear that not all was well on the ground.

[Houston Chronicle, 2023](#)

I outlined my reasoning [last week](#) for being shocked that SpaceX intended to

launch from a rather simple raised stand over a solid slab of concrete. It was something no one else in the world does with large rockets. In every major launch facility worldwide, complex civil engineering trenches, diverters, and high-volume water sprayers protect structures, the surrounding environment, and the rockets themselves from the tremendous acoustic and thermal forces blasted out from tens of tens millions of pounds of thrust.

SpaceX rolled the dice instead. And now we know why these protections are in place.

Jack Beyer, [Twitter](#)

During the launch, concrete chunks from the instantly desiccated concrete pad were observed flying in all directions. Car-sized concrete boulders embedded with steel rebar could be seen effortlessly tossed into the ocean nearly a mile away from the pad, immediately identifiable by the large splashes generated as they struck. Shortly after the launch, particulate debris of silt, construction debris, and other torched materials rained down on Port Isabel, five miles from the launch site.

Pable De La Rosa, [Twitter](#)

These impacts were reported in numerous outlets, including two mentions of yours truly in the [New York Times](#) and [CNBC](#).

I cannot describe the basic impacts better than what's been [reported in local](#) and national news; I will not try to do so. But as the press scrambled to cover the stunning level of destruction in the immediate area and the much larger than anticipated debris field, lots of them reached out to me, a lone blogger, for insight. Plenty of people online shared my post from last week, which is sitting at over 100,000 views, a number that blows my mind.

The broad consensus seems to be that I was right, which is partially true. We can **qualify** some things, such as: the site was poorly designed for intended

purpose. That SpaceX and the FAA did not disclose the actual impacts to the surrounding areas as required by law. These two broad points are pretty obvious. But, in the broad Risk Assessment field (which is where NEPA and my professional experience intersect), we think about things as probabilities, so there are unknowns. Unknowns such as: *what were the real odds for an event we saw occurring? How much worse could this have been? What did SpaceX and FAA know or suspect that they failed to tell the public?* Those questions must be asked, and as much as we all love snap judgments, I don't think it's fair to **quantify** the risk failures yet.

But, given the level of interest in my [research over the past 18 months](#), I figure it's best to outline a few things:

1. What went wrong from a regulatory stance.
2. What are the legal and regulatory risks on the horizon
3. What will allow Starship to launch once again from South Texas

Let's have at it.

How FAA's NEPA Submittal Failed

On a very basic level, the National Environmental Policy Act (NEPA) doesn't exist to tell you what you can do. It's not an operating permit like we see for permits issued under the Clean Air Act or Clean Water Act. Rather, NEPA is all about disclosure.

A Federally sponsored Environmental Impact Statement (EIS) could be developed for the most outrageous project possible. Want to construct a massive open pit tire fire in the middle of the Everglades that burns 24/7/365? You may¹ run into issues with other regulations, but NEPA doesn't care. As long as you describe and quantify all the impacts of your excellent fire pit, NEPA lets you proceed².

Given that, it's important to note that Starbase was authorized under an Environmental Assessment (EA) process, the EIS's little brother. An EA is a scaled-back, shorter, and less burdensome process. But the catch is that it can

only be deployed if the Impacts described are below a level considered “Significant.” “Significance” relies on many factors, from central guidance from the Federal [Council on Environmental Quality](#) (CEQ), to Agency Specific guidelines and Court Precedent.

My argument when writing about “Starbase” from day one has been that the FAA and SpaceX didn’t seek to determine what the actual impacts from Starship development would be, but rather tailored the results of their studies in such a manner to demonstrate that the project would be “insignificant,” preventing years of further delays an EIS would require.

Since we have [an approved EA](#) in hand and now a completed launch, we can compare evidence from launch operations with what was disclosed in the EA to see if it was adequate. So let’s talk about two issues where FAA did not meet disclosure standards.

Large Debris

The worst-case scenario of debris spread imagined by SpaceX and FAA in the PEA is described generally as a 700-acre area in the “no entry” zone of a launch. If this were a circle, it would have a radius of about 0.6 miles. Further, a debris field of this size is only described as being a consequence of an exploded rocket on the launch pad. No debris is expected as the result of a nominal launch.

The [Endangered Species Act consultation](#) document (pg 161) actually illustrates the potential debris field as the yellow rectangle seen below:

We saw massive chunks of concrete flying into the ocean on SpaceX’s own videos posted to social media. Other sources have told me that large pieces of debris were observed in the algal flats to the North and South of the facility, outside of the yellow box.

So, to summarize: a launch that was far from a worst-case scenario (this being an explosion on the pad) generated a debris field well larger than anticipated. This failure may be because the FAA did not foresee that a 74 Meganewton

rocket plume would destroy reinforced concrete as easily as a hammer dropping on a light bulb. Regardless, it is a plain fact that demonstrates the NEPA process was flawed.

Consequences of this debris range from harmless (sitting on SpaceX's developed property) to severe (the tidal algal flats are considered nearly unrepairable by human interaction and take 10+ years to form naturally). The FAA must address and mitigate these problems before allowing SpaceX to launch again.

Particulate Plume

The particulate seen as far away as Port Isabel to the North has been the subject of intense debate since images showed up on launch day. It covered a good portion of the city, almost like a dusting of snow.

Several Journalists who reached out to me immediately honed on the Potential Toxicity this particulate may have on the public. I immediately told them that assuming that we had an [East Palestine chemical fire situation](#) or anything similar would be a huge disservice to the public.

On the other hand, social media posts from fanboys and libertarians brushed the issue off as "just a little sand," and essentially not a big deal. That characterization is wildly inaccurate. Any dust is considered a pollutant under the Clean Air Act, as [particulates can and do cause measurable health issues to people exposed to them](#). Additionally, absent a chemical assay, saying it's "just sand" is lazy. Ablated construction debris heated to 1000 degrees and dispersed in the air could indeed have oxidized carbon compounds, ash and heavy metals.

All that said, the miles-wide particulate plume was categorically not mentioned in the PEA, nor was it considered a possibility in any supporting documentation. This is a failure of NEPA under CEQ guidance and the [FAA's own NEPA handbook](#). Again, the EA document failed because a consequence that occurred and was measurable was not considered.

What Regulatory Consequences Lie Ahead?

The regulatory and legal battles ahead are far more uncertain. FAA has opened a Mishap investigation into the on-the-ground debris field. This is in addition to the anomaly investigation into the rocket failing to complete its mission. There will be zero launches until the FAA is allowed to do a complete investigation.

A source from NASA, familiar with these investigations, who reached out to me said FAA's investigation, especially since it is considered a "Mishap," a more serious outcome than a mere anomaly, will take at least 90 days. That's probably a good starting point for having FAA's assessment of the failures and required corrective actions in hand.

FAA will have to cure any general public safety concerns regarding the flight itself. Being very much not an expert on rocket failures, I would be foolish to make any specific predictions or commentary, aside from the easy prediction that FAA will look at how much the blasted launch pad itself played a role in the flight failure.

On the NEPA front, I would presume that the FAA will take a look at where the environmental review and disclosure went wrong. I've underestimated their willingness to turn a blind eye in the past, but I have a hard time believing they can avoid discussing them. I am certain that the Fish And Wildlife Service will, at minimum, ask these questions. FAA could say "we need an EIS now," which would be a significant blow to SpaceX. I do not expect this to occur and instead they will reevaluate the EA and make changes to mitigate the debris field debacle we observed on 4/20.

Lawsuit Time?

If I were a potential litigant against the FAA and SpaceX, I would be licking my chops. Litigants in NEPA cases are generally environmental non-profits (think Sierra Club), and they seek to use courts to not only stop or alter projects they view as harmful, but to shape policy as well.

Given FAA's many mistakes in the process, such as [using plume models run in 2019 for a 20% smaller rocket than what SpaceX has built](#) (as discussed in last week's post), this gives a great legal opening to tear apart FAA's methodology.

Agencies like FERC (the Department of Energy organization that permits pipelines and LNG terminals) have a reputation for developing NEPA assessments and studies that are legally sound and very comprehensive. FAA, on the other hand, doesn't have the best reputation for developing great NEPA documents³.

The fact that on SpaceX's very first launch, rather large, obvious environmental consequences occurred that were neither predicted nor described is a great starting point for a lawsuit. Litigants may seek to have the courts order FAA to complete a new EIS, or they may settle for FAA agreeing on even more mitigations, offsets or concessions. I'd be shocked if we don't see a large, well-funded lawsuit filed in the coming weeks.

What SpaceX needs to return to flight

Given all the issues I've described above, we need to discuss the real question on everyone's mind: When Can SpaceX Launch Again?

Take a look at a particularly deranged Twitter interaction between Eric Berger, SpaceX's pet journalist, and Mr. Musk:

Berger, *credulous as always*, takes a single SpaceX ex-employee's speculation and posts it as fact. Musk replies that a water-cooled plate can be installed in one to two months, and they're good to go.

Ignoring that FAA is going to have a lot to say about this, the site itself looks like a bombed-out hellscape. No one in their right mind thinks⁴ they can rebuild in 30 to 60 days. It's plainly nonsense, which is sadly par for the course regarding Musk Predictions.

Now, there's a very specific reason Musk is honing in on a civil project (in a steel plate with entrained water) that will not have a massive footprint. As discussed last week and last year, trenches and water deluge systems are massive civil engineering projects.

SpaceX applied for an Army Corps permit in 2019 to develop some of the surrounding land, but then Musk, in a hissy fit in 2021, told the press that if SpaceX doesn't get approval in Texas they'll just move to Florida. The Army Corps looked at SpaceX's dredging permit application, which clearly stated that the land in Texas is the only place they can launch Starship from. Since a 404 Clean Water Act permit requires you to consider reasonable alternatives for siting your project, Mr. Musk's words directly contradicted their permit application. SpaceX did not respond to this line of questioning, and the Army Corps pulled its Application in February 2022. SpaceX has not reapplied for a Corps permit since.

The FAA is going to have a difficult decision on its hands. Do they let SpaceX test out an unproven heat and sound plume protection device, given the last test of a "new way to launch super rockets" failed miserably in a hailstorm of concrete? If the FAA approves this protection equipment and no other regulatory process slows down SpaceX, we could see a launch in 6-12 months.

However, if the FAA insists on a full civil rebuild to accommodate a traditional flame trench, the Corps permitting alone, coupled with a Texas Commission on Environmental Quality (TCEQ) Clean Water Act 401 review, will take at least 2-3 years before construction can begin.

Summing Up

I realize this post is not easy reading, but I hope it serves as a decent roadmap for some of the environmental questions that will keep popping up in the coming months.

As always, shoot me an email at ESG.Hound@gmail.com if you want to chat.

Thanks for Reading - Eric

1

You absolutely would have plenty of environmental approval issues, for obvious reasons

2

This is an incredibly broad statement, for illustrative purposes only

3

This is water cooler chat from Enviromental Lawyers

4

The [Angry Astronaut](#), someone who is mostly objective and is a big fan of SpaceX agrees. Good enough for me

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COMMENT

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From: Gray, Lesli <lesli_gray@fws.gov>

Sent: Friday, April 28, 2023 10:32

To: Polk, Jonna E <jonna_polk@fws.gov>; Willey, Seth <seth_willey@fws.gov>; Ardizzone, Chuck CA <chuck_ardizzone@fws.gov>

Subject: Does the attached SpaceX BP need any updates

Good morning,

I wanted to check in and see if we need to update the attached bp in any way given last week's launch?

Take care -
Lesli

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