



Hurricane Ike and Oil Refineries/Infrastructure Damage Models Thread #3 (21:00 EDT 9/11)

Posted by [Prof. Goose](#) on September 11, 2008 - 10:10am

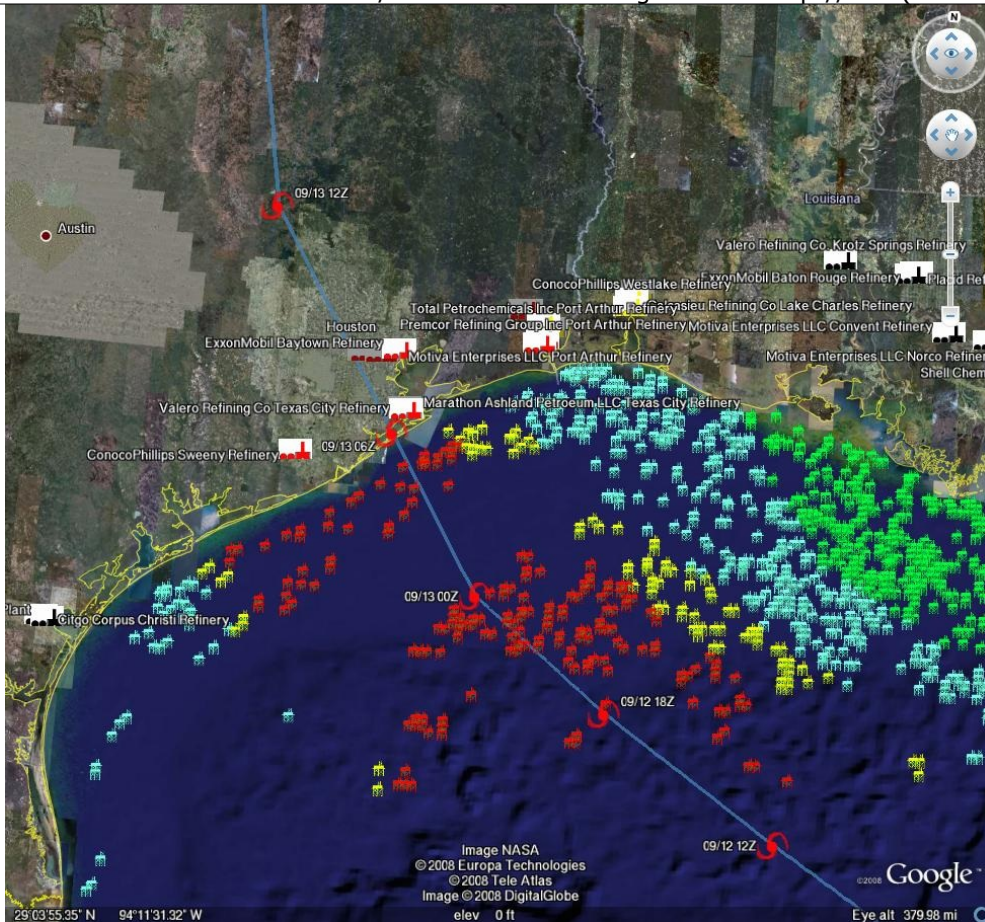
Topic: [Supply/Production](#)

Tags: [chuck watson](#), [henry hub](#), [hurricane gustav](#), [hurricane ike](#), [loop](#), [louisiana offshore oil port](#), [methaz](#), [oil](#), [oil infrastructure](#), [original](#), [peak oil](#), [refineries](#), [refining](#), [shut-in production](#) [[list all tags](#)]

(Welcome: we are now on a later and more updated thread, which can be found here: <http://www.theoildrum.com/node/4525> NB: you may want to just go the front page (it will be post #1 or #2) to get to the most recent thread: <http://theoildrum.com> ...)

Hurricane Ike's current track predicts landfall within 100 miles of Galveston Saturday morning; but the storm isn't strengthening much yet and the track has been moving northwards--so, because of the wobbles in the track, models are still uncertain. **Within the current NHC storm path lies over 5 million bpd of US petroleum refining capacity.** (Perspective: 5 MMBBL is about 30% of US capacity (about 15 MMBBL), and a bit less than 6% of global capacity (~85 MMBBL). Also, the [MMS](#) reported Wednesday that staff has been evacuated from 452 production platforms (63.0%) and 81 rigs (66.9%) – (95.9% of the oil production and 73.1% of the natural gas production has been shut-in as a precautionary measure for Hurricane Ike.)

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Current path estimates for Hurricane Ike (Methaz GFDL Sep 11 (15:00 EDT)-click twice to enlarge

For all graphics: Rigs/Platforms: Blue: evacuated only; Yellow will require inspection before restart; Red: damage requiring repair; Refineries: Black: operational impact (partial shutdown) Green: Operational impact (full shutdown) Red: Damage likely; Ports: standard hurricane flags for wind

Here is the latest update from [Chuck Watson at KAC/UCF](#) as of 11 Sep 21:00 EDT:

Still waiting on strengthening. Official NHC intensity forecast at a Cat 2. Hoping that this doesn't blow up overnight. We'll know a lot more in the morning. Relatively same forecast as earlier.

11 SEP 15:00:

The latest track models are converging on the Houston area, between Freeport and High Island. That's bad news from a refinery perspective. The question is increasingly shifting from "where" to "how strong", and with Ike that's a tough question to answer. The threshold to watch for as the storm approaches landfall is 100 knots (115mph). For

every 5 knots less than that the damage drops off rapidly, and more importantly the recovery times improve. If the storm landfall intensity is over 100 knots, we start to see damage that requires major structural work and therefore recovery times start to skyrocket.

The latest GFDL scenario is not pretty, and the refinery estimate from this morning (nearly 6 MMBBL/day of refinery capacity for over a month, (38% US/5% global capacity) is in play.

I'm still skeptical the surface winds will be over 100kts at landfall. The good news is that Ike is having a hard time getting organized. There is a fair amount of dry air to the west, and if it gets entrained the storm will collapse. The bad news is that Ike is still pushing the dry air out of the way, and there is still plenty of time for it to get organized. Lots of discussion about the size of the wind field, and it is true that will elevate water levels and damage coastal property. But from the oil/gas perspective, that doesn't concern me as much as the organization of the winds in the core and damage swath. HWRF essentially crashes the intensity to tropical storm strength before landfall - I think that's pretty dramatic, but a cat1 landfall wouldn't surprise me. A Cat 3 would. Again, don't bet your life on it - get out of the way!

I'd leave the door open to a further east track as well - like Port Arthur - that's a 1 in 3 in my thinking. (2 in 3 Houston, 1 in three to the east).

We will be posting periodic updates of track and damage forecasts here, because one never knows if one of these events will be seminal. We're not hurricane experts at theoil Drum.com. Thankfully we have an expert meteorologist who sends us track and damage forecasts relevant to oil and gas infrastructure. What we try to do on this site, (and have been doing for over 3 years), is articulate the fragility and urgency of our nation's, and our world's, energy situation. As Hurricane Ike moves nearer, and professional analysts gauge the impact it may have on our energy infrastructure, feel free to browse our archives of empirically based analyses and perspectives on the many aspects of our energy situation that form the backdrop not only for this hurricane, but for any exogenous event that disrupts the increasingly uneasy balance between energy supply and demand.

[NHC Forecast for Hurricane Ike - click to go to Wunderground](#)

[Here](#) are depictions of various Texas cities storm surge maps under different Hurricane scenarios from Weather Underground.

Regarding [Port of Houston](#):

The Port of Houston is closing tonight as Hurricane Ike approaches, most coastal refineries will make storm decisions today, and offshore energy facilities are extending precautions they took just a week ago for Hurricane Gustav.

The Barbours Cut and Bayport terminals will shut down at noon today, and the port will close to all vessel traffic at midnight, spokeswoman Argentina James said. The Port's 25-mile-long complex is a hub in the nation's energy network. Forecasts Wednesday evening projected Ike

would come ashore Saturday between Corpus Christi and Galveston. Port Freeport, about 65 miles south of Houston in a mandatory evacuation zone for Brazoria County, shut down early Wednesday afternoon and expects to reopen Monday, Chief Executive Pete Reixach said. As vessel traffic declined, gasoline retailers were gearing up for a possible surge of evacuating motorists. Motiva, a refining and retail gasoline joint venture between Shell Oil Co. and Saudi Arabia's state-owned Aramco, said in a prepared statement that its coastal service stations and refueling terminals were being stocked up in anticipation of higher demand. Shell-branded stations also were setting up generators to keep pumps running in the case of a power outage.

Here is the latest update from [Chuck Watson at KAC/UCF](#) as of 11 Sep 9:30 EDT:

Ike continues to wobble towards Texas - where is still an open question - and continues to not intensify. As noted by NHC this morning, the interior structure of Ike is unusual. It's not unusual for a storm to have two eyewalls during what is called an eye replacement cycle; it is unusual to maintain these structures over an extended period of time. The outer wind maximum is helping to keep Ike weak; if it collapses the inner core can strengthen rapidly. I'm still thinking mid Cat 3 is the max this storm will get, and high Cat 2 at landfall, but those who argue for Cat 4 could still be right if Ike gets his act together - I just don't think that is likely. As usual, take all such speculation with a grain of salt and if you are in the way of the storm get out.

(9/10 16:30 EDT Update):

If the GFDL scenario plays out at Cat 3 or higher, current tracks are *bad news* for refining capacity. The current GFDL scenario is very close to the LBAR scenario mentioned this morning. Current track would take out long term 5-10% of GOM production, but that's not the problem. So, if the GFDL scenario plays out at a Cat 3 or higher, we are looking at having 20% of US refining capacity, and 5% of global capacity, offline for a month or more. Production side damage becomes irrelevant at that point.

Once again I'd like to remind everyone that these discussions are with regard to a bunch of valuable, important, but ultimately replaceable hardware. Follow the instructions of your local officials, and evacuate if that is recommended.

(Sep 10 11:30EDT) update, (since revised, but it contains additional information)

It is vital to understand that very slight wobbles - even 10-20 miles - can make a huge difference in damage. Remember that swath of heavy damage for most hurricanes, even intense ones, is only 50-75 miles wide. Also recall that damage is exponential - 110 mph winds may be 10% higher than 100 mph winds, but will cause 20% more damage.

Chuck Watson has put together a dynamically updating page that will reflect the latest damage models/forecasts at this link: [KAC/UCF models](#). We will be updating this thread with damage

A note on our modeling process: we take the official NHC track, the raw computer model tracks like GFDL, HWRF, LBAR, etc, and even run our own in-house fast cycle track/intensity models. These track and intensity estimates are feed to our main hurricane model (TAOS), which computes the wind, waves, storm surge, currents, etc. at each point in our database of over 50,000 elements in the GoM like rigs, platforms, pipelines, pumping stations, refineries, etc. We then have engineering models for each type of infrastructure that calculates the damage and estimated down time for that element, as well as downstream impacts (eg if a pipeline is down, the upstream elements can't pump and the downstream elements don't get product).

PRODUCTION/INFRASTRUCTURE MAPS AND REFINERY INFORMATION

[Here's a link to a really good map of oil refining/SPR storage facilities in respect to the path of Katrina](#) (NB: OLD TRACK MAP!) and [here is a listing of production and refining capability for the state of LA](#).



Just to give you a rough idea of where things are, the map above is a [probability swath for Katrina](#) (OLD TRACK MAP!) with the [Thunder Horse](#) platform as the red dot, and the other purple dot represents the [Mad Dog](#) development (100,000 bd); the [Holstein](#) development that produces at peak, around 100,000 bd of oil; and the [Atlantis field](#) that may have ramped up to around 200,000 bd in all. Put together these projects have the potential of around 650,000 bd, but as can be seen, they were sitting in an uncomfortable spot relative to the track of the Katrina. The white dot is where Port Fourchon is. This is where the [Louisiana Offshore Oil Port, or LOOP](#), is located. [Rigzone](#) pointed out that this is where the foreign tankers offload, [Google](#) and [Terraserve](#) maps you can see that the area is very low-lying. One of the big concerns is that there will be sub-sea landslides or other ground movement that might affect the LOOP. Were this to be disrupted, then foreign tankers would need to be diverted elsewhere, with the likely port being Houston.

[Here is a really good link/map \(from "Rod and Reel" no less\) of the LA southern coastline showing all of the Submersible and Floater Gulf rigs](#).

We have accumulated resources from previous hurricanes below, but we'd like to find updated materials if you know of them. Recent refinery maps, recent rig maps in the gulf, recent gas fields, SPR facilities, the Intercoastal Canal, pipeline stations and transfer points, etc., etc. Leave links in the comments please.

Also, here's the EIA's [Alabama](#), [Louisiana](#), [Mississippi](#), and [Texas](#) Resources pages. They will also

[Here's another good resource for infrastructure maps and such. \(scroll down a bit\)](#)

[Here's a map from CNN with large and small refineries laid out.](#) (though it is an old storm track)

[Very detailed piece by RIGZONE on rigs and other infrastructure in the area.](#) (thanks mw)

[Here's a flash graphic of the oil refineries and rig maps from Hurricane Rita, it emphasizes Beaumont and Galveston's importance.](#) Click on oil production in the tab. Note the many rigs on the east side of the storm that will get the brunt of the damage from the NE quad of the storm...hence the high long-term GOMEX oil production damage estimates below.

[Here's a link to Rigzone's coverage of Ike.](#)

You want a detailed map? Well [here's the probably the best MMS map I could find. Very detailed and lots of interesting stuff. \(VERY big .pdf warning\)](#)

Also, Scott Wilmoth at [Simmons & Co](#) was kind enough to send us this map. The map below captures only deepwater infrastructure. For a complete list of deepwater development systems (includes operator, depth, location): <http://www.gomr.mms.gov/homepg/offshore/deepwatr/dpstruct.html>

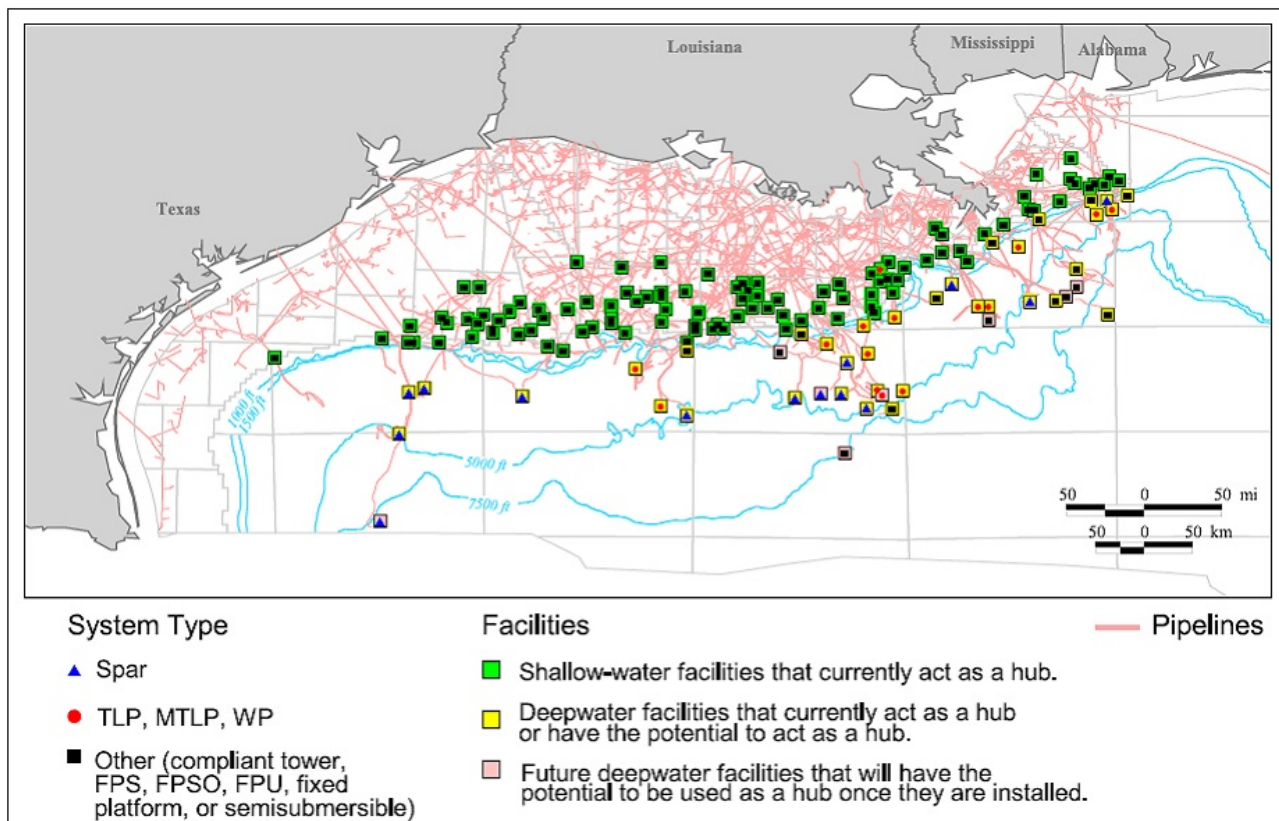


Figure 10. Current, potential, and future hub facilities.

(Please deposit new relevant links, graphs, and comments in this new thread...we have updated the resources part of this post with new maps and some more old maps and articles from Katrina on the LOOP and Port Fourchon--important parts of the infrastructure, as we learned about three years ago. Please leave personal anecdotes and themes unrelated to hurricane for the other upcoming 'bigger picture' posts, as some of these larger images are difficult to upload

We appreciate your help accumulating resources, stories, and newstips in the comment thread below!



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