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Investment Impact of Water Reliability—Recent Dow Experience

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INVESTMENT IMPACT OF WATER RELIABILITY—RECENT DOW EXPERIENCE[†]

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I. INTRODUCTION

All human activity requires water. Some activities are short enough that water consumption does not need to occur during the activity.

† DISCLAIMER: This paper represents the personal views of Paul Bork and not those of The Dow Chemical Company and/or any of its subsidiaries (Dow) or any organization to which Dow is a member, any similarities between these views may not be entirely coincidental, but they are independent.

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Examples of this are a Sumo wrestling match, Karate sparing and traveling to and from work (for many people). Some activities are moving and the water can be consumed in only part of the geography where the activity occurs. Examples of this are while driving through Death Valley the Author carried some in a container and consumed during the traverse when the Author made the trip, but clearly this could be accomplished without consuming water (provided nothing significantly slowed the traverse), a boxing match and traveling to and from work (for other people). All other human activities require the consumption of water during and in the locations where the human activity occurs.

For some human activity, the activity itself consumes water as well as needing water for the human part of the activity. One example of this is Dow's Freeport Texas chemical complex ("TXO"). TXO is the largest chemical complex in the United States, employing 8,000 people (including contractors), operating sixty-five world scale production plants, producing billions of pounds of products (44% of Dow's US sales), which are shipped out in pipelines, on trucks, rail and ships on 5,000 acres of property at the end of the Brazos River.[1] This facility operates 24 hours a day, 7 days a week and 365-6 days a year. TXO is the successor of the United States government's chemical complex, built to support World War II. Dow was the operator of this facility for the US government and purchased the site when the war was won. TXO needs water to support its employees, as well as for the chemical production processes. Since water is needed to operate TXO, investment will only occur if the water supply is reliable. This paper addresses that reliability of that water supply, in general and in response to the Texas Commission on Environmental Quality ("TCEQ") enforcement of recent water rights calls TXO has made on the Brazos River. These concerns have recently been highlighted in the drought of 2011, which has been called the worst single year drought for Texas.[2]

II. WATER RIGHTS—LEGAL BACKGROUND

Rather than repeat the work of others in this area, this paper merely cites with approval the recent paper of Michael Booth[3] for its presentation of the background and current status of the law, includ-

1. ABOUT DOW IN TEXAS, DOW, http://www.dow.com/texas/freeport/about/index.htm (last visited Apr. 12, 2013).

2. *See generally* Chris Amico et al., *Dried Out: Confronting the Texas Drought*, STATE IMPACT TEX., http://stateimpact.npr.org/texas/drought/ (last visited Mar. 28, 2013).

3. *See generally* Michael J. Booth et al., *TCEQ Water Curtailment Rules – How Meaningful is the Priority System?*, UTCLE—Water Law Seminar, Nov. 1–2, 2012, http://www.utcle.org/eLibrary/preview.php?asset_file_id=36172.

ing TCEQ's regulations and the ongoing case[4] challenging the existing TCEQ water call regulations and their application. The Author expresses no view regarding the paper's presentation of Mr. Booth's views with respect to the legality or appropriateness of these regulations or his views on this case. The Author notes in passing that the second sentence in Section D of this paper should read in part, "A priority call made by The Dow Chemical Company ('Dow') on November 14, 2012." Any similarities between the views of Mr. Booth and those of the Author may not be entirely coincidental, but they are both independent and beyond the scope of this paper.

III. TXO's Water Use

TXO chemical processes consume water to carry heat and energy. Examples of this are the cooling and condensation of chemicals and chemical intermediates, as required by heat exchangers and distillation columns. Another major use of water is the conversion of water into extraordinarily pure water, which is then boiled and superheated to produce the various grades of steam that is used to heat and boil chemical intermediates and feeds; as required in heat exchangers, boilers, re-boilers and distillation columns. Most of this water is recycled. Some water is recycled by passing the cooling water through a cooling tower, which evaporates some of the water and cools the rest down; it can then be collected, treated and reused for cooling again.

Other water is recycled by being collected, treated and re-boiled into steam which can be reused for heating again. Unfortunately, both of these recycle processes concentrate undesirable materials in the recycled water, limiting the number of times the water can be recycled. This is accomplished by diverting a part of the recycle stream into a purge or waste stream. This water ends up as part of the TXO Texas Pollution Discharge Elimination System ("TXPDES") discharge stream. Enormous efforts are made to reduce the size of these purge streams, but after all efforts are exhausted, some purge is needed for all recycle streams. Sometimes the recycle loop is insufficiently closed to require an express purge stream. One example of this would be a chemical process that required water in the product. If a sufficient part of the recycling water stream were to be incorporated into the product, an express purge stream may not be required.

TXO chemical processes consume water to carry other chemicals, as water is a chemical, not reacting in most chemical production processes (at least not intentionally or significantly). An example of this is to carry salt from underground salt domes into the chlorine and caustic production plant. This one plant generates both chlorine and caustic (sodium hydroxide) in a ratio that the chemistry fixes as 1.00 to

4. *See* Tex. Farm Bureau v. Tex. Comm'n on Envtl. Quality, No. D-1-GN-12-003937 (53d Jud. Dist. Ct., Travis County, Tex. *filed* Dec. 14, 2012).

1.01. Many other processes use water to carry chemicals or particulates from place to place.

TXO chemical processes consume water as reaction media. An example of this is reaction of salt in a chlorine and caustic production plant. The reactivity of a chemical can be moderated by reducing its concentration, thus having the reaction take place in water sometimes provides a means to control the rate of reaction. Again the water is normally recycled, but a purge is required. Again, a chlorine and caustic production plant is an example of this.

TXO chemical processes consume water as a component of their products. An example of this is the 50% caustic that Dow sells. The diluting reduces the costs of the production, as the caustic is made at less than 50% strength and a more concentrated caustic would require removing more water. The 50% caustic is less reactive and dangerous to use. A similar home product where a large part of the produce is inert is laundry soap. It is easier to place about half a cup of laundry soap into a load of laundry than measuring out a teaspoon. Marketing may also play a part in the home-laundry use.

TXO chemical processes require people to operate and these people require water, as do all people. While a small percentage of the TXO water use, all usage is critical. As the children's story goes, the lack of a nail can cause the failure of the war.

TXO also uses water for firefighting. In the unlikely event a fire were to occur in various places in the TXO, water, collected in a fire fighting pond and directed with a dedicated firefighting water distribution system will be used to fight the fire.

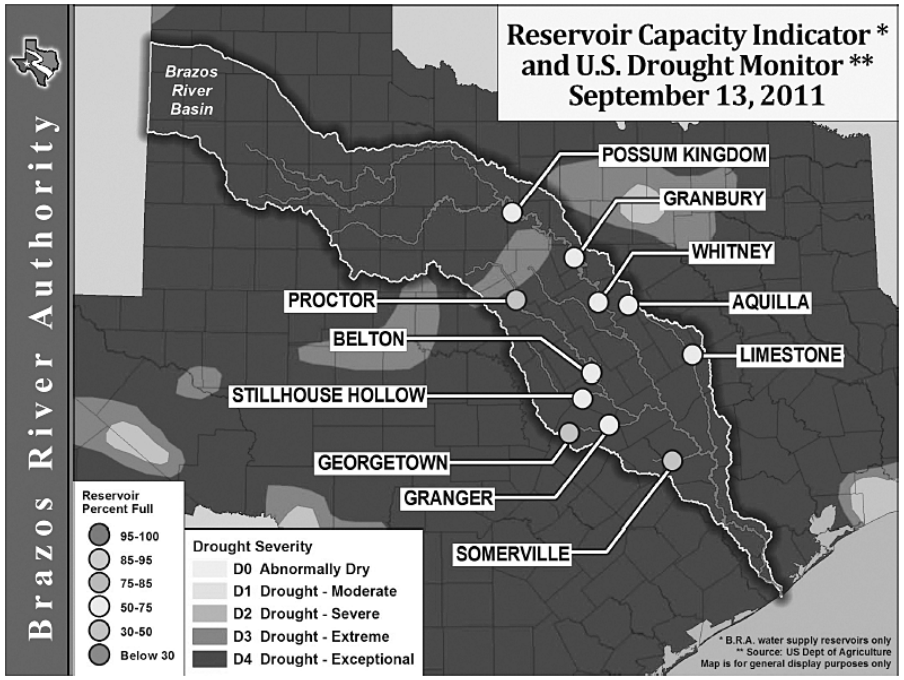
In addition to these requirements, TXO shares about 10% of the water it consumes. This water is shared with nearby neighbors, including local industry ("BASF"[5] is an example of this) and municipalities (the city of Lake Jackson is an example of this).

For these reasons, TXO requires good water all the time. Dow is in the chemical manufacturing business. Dow does not desire to be in the water business. However, it is unacceptable to Dow for TXO not to have water for any quarter, month, day, hour, minute or second and Dow must be in the water business to a sufficient degree to obtain the necessary continuous supply of good water.

A. *Details of Brazos River*

The Brazos River is the second largest River reaching the Gulf of Mexico from the United States, crossing Texas.

5. www.basf.com (last visited Apr. 23, 2013).



The inserted diagram from the BRA shows the reach of the Brazos River and the drought stage of Texas on one day during the 2011 drought. The flatness of Texas and the Brazos River is such that the Rosharon Gage, at river mile fifty-six, is tidally influenced during periods of low flow, or the flow increases in periods of low tides and decreases during periods of high tides. This back and forth surges of the tidal water makes measuring the Brazos River flow over short times difficult.

B. *Details of TXO Water Demand*

TXO has a number of water rights, but typically they are operating under a 1942 water right.[6] This is one of the most senior water rights on the Brazos River. It has two water intakes, one at mile marker twenty (Brazoria Intake) the other at mile marker forty-six (Harris Intake). This makes TXO the last water intake on the Brazos River. TXO has two reservoirs, one near each intake. They are operated as one reservoir with a combined capacity to operate TXO for about a

6. Certificate of Adjudication 12-5328:

February 28, 1929:	20,000 acre feet
February 14, 1942:	150,000 acre feet
April 4, 1960:	65,000 acre feet
March 8, 1976:	3,136 acre feet

month.[7] TXO consumes about 310 acre feet of water daily.[8] During periods of droughts when the air is dry and blowing, many reservoirs lose as much water to evaporation as they do to consumptive use, so the experience is that these reservoirs are expected to produce sufficient water for at least forty-five days of operation. Keeping reservoirs full can become a water demand during periods of drought and near drought.[9] Pumps are not continuously variable and come in large sizes. TXO has the ability to pump 180 cfs (360 acre feet/day)–taking the rest of their demand from the reservoirs or pump at 290 cfs (580 acre feet/day)–putting the surplus of the pumping into the reservoirs to fill them.

A further factor for TXO is that the bottom of the Brazos River is below sea level all the way up the river to the Harris Intake. This means if there is insufficient water flowing down the Brazos River to keep the Gulf of Mexico at bay (intended), then the Gulf of Mexico water will flow up the Brazos River bed and produce sea water at the Harris Intake. Experience shows that the front edge of this "salt water wedge" moves down the Brazos River when there is about 100 cfs flowing past the Harris Intake and upstream edge of this "salt water wedge" moves up the Brazos River when there is less than about 100 cfs flowing past the Harris Intake.[10]

The form of the "salt water wedge" means that a structure blocking the bottom of the Brazos River and allowing free flow at the top of the Brazos River can effectively stop the upriver flow of the "salt water wedge" without requiring additional river flow of fresh water. This structure is called a salt water barrier. There are two types of salt water barriers, permanent (an example is at the end of the Guadeloupe River)[11] and temporary (made largely of earth and which is expected to be washed out each year during the period of high river flow).[12]

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7. TCEQ—Questions for Senior Water Right Holder Making Call, Nov. 14, 2012 (*see* attachment).

Brazoria Reservoir	21,000 acre feet
Harris Reservoir	7,000 acre feet

8. TCEQ—Questions for Senior Water Right Holder Making Call, Nov. 14, 2012. Average daily use for the first ten months of 2012 was 306 acre feet.

9. Historically, Dow consumed 440 acre feet/day, or 140 million gallons per day, or 220 cubic feet per second or 100,000 gallons per minute.

10. Since the increase salinity of sea water also causes the sea water in the Brazos River bed to be more dense than the fresh water, the sea water forms a wedge, where the sea water is further up the Brazos River at the bottom of the Brazos River bed than it is at the top of the Brazos River.

11. *See* discussion in http://articles.orlandosentinel.com/2012-06-29/features/sns-mct-gbra-puts-in-saltwater-barrier-on-guadalupe-20120629_1_water-level-water-supply-river-level (last visited May 3, 2013).

12. *See* Dow's attached extract from their permit for a temporary salt water barrier.

IV. Levels of Protection

We have a non-unique concept in the chemical industry, levels of protection ("LOP"). It is used in many areas without such formality–for example, in the legal arena of wills. One might expressly disinherit a daughter, then allocate all the assets and finally have a residuary bequest to another. This would have three LOP. However, in the chemical industry, this can be a very formalized process. For example, to keep chemicals out of the environment, we may have vessels, pipes, fittings and valves designed not to leak as one LOP, we might have an aggressive inspection and leak fixing program for a second LOP and a containment system, for example, a dike or dome over the plant as a third LOP.

A pressure relief valve, routed to a flare might be another LOP. However, these levels of LOPs might not protect against the same incidents and might not be independent, so they may not count as four independent LOPs.

A. *LOP in the Water Arena—Reservoirs*

One may ask if a reservoir can be a LOP for TXO against failure of the Brazos River water supply. While a reservoir can be a partial LOP, this is not an independent LOP, as the reservoir is filled from the Brazos River and only lasts while water from the Brazos River is in the reservoir.

Dow actually has two reservoirs, which contain about a month of water. One can suggest that this is a LOP against the Brazos River being out of good water for any second, minute, day, or perhaps month. However, Dow operates TXO in a manner that is knowingly safe and inside applicable permits and legal requirements. Several days of operation are needed to appropriately shut down TXO, so this LOP is only effective against the Brazos River being out of good water for any second, minute, day or couple of days. The reservoirs are not a LOP against the Brazos River not having good water for a month or quarter.

Additionally, the reservoirs are not independent of the Brazos River, as there needs to be sufficient water in the Brazos River for Dow to fill, re-fill and keep the reservoirs full against losses, such as evaporation. Dow has a limited physical and permit capacity to pump water from the Brazos River, so the Brazos River has to have a sufficient surplus of water, beyond TXO's current needs to allow re-filling of the reservoirs after their partial consumption to have the reservoirs function as a LOP.

B. *LOP in the Water Arena—Alternate Supply*

In many ways, water is similar to other utilities needed to operate TXO. For example, electrical power is necessary for each and every

chemical plant and the operation of all TXO. A common way to address reliability in the supply of electricity is to dual source the plant's electrical grid. TXO generates its own power and also has a linkage to the commercial Texas power grid. This means for some power reliability issues, TXO can switch the source of electrical power and continue to operate during a reliability issue with one of its power sources.

One might ask if this concept is applicable to water supply for TXO. Texas has a concept of a bed and banks permit[13] that allows a person who is selling water to convey that water down the Texas rivers, with the water legally, but not physically, separated from the natural flows of the Texas rivers. Similar to wheeling power from other sources, there are losses as the water is transported down the Texas rivers, but the legal ownership of the water is reserved for the purchaser. Water is different from power in that Texas owns the wheeling mechanism rather than a commercial company, and allows fairly unconstrained use of the wheeling mechanism.

1. LOP in the Water Arena—Alternate Supply—Commercial Reservoirs

Some background is needed here to understand the next issues. Texas law allocates water in Texas rivers on a priority basis, "first in time is first in right."[14] The right to this priority is a water right. These water rights are property rights.[15] However, Texas treats water held in a reservoir as not subject to allocation according to water rights.[16] This is true even when the water is released to the same river from which it was captured.

This fairly unconstrained use of the wheeling mechanism is required to allow commercial use of water from reservoirs, which for the purposes of this paper is the selling of water. Other use of water in this paper, such as that by TXO is designated consumptive use. On the Brazos River, the Brazos River Authority ("BRA") operates most of the reservoirs and sells most of the water.[17]

Commercial water use requires that the water stored in reservoirs be severed from water rights. Otherwise there would be no reason for anyone to store water in a reservoir, as the water would be required to be provided at no cost to any water right holder with an older water right than the one under which the water was stored. One aspect of water law that could benefit from some fine-tuning is the concept that water cannot be diverted into storage while a senior water right has an

13. TEX. WATER CODE ANN. § 11.042 (West 1997 & Supp. 2012).
14. TEX. WATER CODE ANN. § 11.027 (West 2005).
15. Tex. Water Rights Comm'n v. Wright, 464 S.W.2d 642 (Tex. 1971).
16. TEX. WATER CODE ANN. §§ 11.036, 11.091 (West 2011).
17. *The Brazos River Authority Mission*, BRAZOS RIVER AUTH., http://www.brazos.org/ourMission.asp (last visited Mar. 26, 2013).

outstanding call. Lack of precision in implementing this aspect of Texas water law allows a reservoir owner to divert water from the senior water right to fill a reservoir, requiring the purchase of water from this or another reservoir. The total flow in the river does not change, it just has the effect of unjustly enriching reservoir owners from those owning senior water rights.

Commercial reservoirs rely on the ability to store water with a small amount of loss. In the power area, the equivalent to commercial reservoirs are peaking power generators, such as many gas turbines and hydroelectric power generators from some reservoirs. Commercial reservoirs, unlike peaking power generators do not create any additional water. They are not an additional source of water. They are not an independent LOP. They are simply changing the time some water is in the river.

There is only one way a commercial reservoir makes any sense. This is when a river cannot meet the water demand from the river, but the river's average flow is sufficient to meet the average water demand from the river. For some commercial reservoirs, the flow rates will allow slow filling of the reservoir over a period of years and the selling of water over another period of years during drought or periods where the periodic flow is below the demand. Other commercial reservoirs will be blessed with high flow rates and the physical ability to fill the reservoir with an episodic event, perhaps several times per year, even during drought periods. The types of commercial agreements an operator of a reservoir enters will reflect the needs of their customers. Some will be buying water each year, these customers will not have any water rights themselves (many cities are in this category),[18] others will be using the reservoir capacity only as a backup water supply or as a LOP against a drought water shortage. There are also opportunities for episodic purchasers of water to acquire the residual of a water supply agreement from a continuous water purchaser, particularly if the continuous water purchase has agreements allowing for growth–at least until that growth occurs.

From a LOP perspective a commercial reservoir is not an independent water supply, but this can be a very significant LOP against the more numerous, shorter-term water supply issues.

2. LOP in the Water Arena—Alternate Supply—Real Alternate Supplies

If commercial reservoirs are not a real alternative supply, but simply change the time some water is in a river, one can ask if there are any real alternate supplies of water. Yes, there are some real alternate

18. ORDER SUSPENDING WATER RIGHTS ON THE BRAZOS RIVER, APPENDIX C: JUNIOR WATER RIGHTS NOT SUSPENDED BY THIS ORDER 1–2, TCEQ, Nov. 27, 2012, http://www7.tceq.state.tx.us/uploads/eagendas/Agendas/2012/12-5-2012/2012-2421-WR.pdf.

supplies of water. Four come to mind: 1) from a different river, 2) from groundwater, 3) another user's return and 4) from the ocean. There is an effective fifth alternative, which is an effective substitute for obtaining water: a salt-water barrier. Finally, there is an effective sixth alternative, which is also an effective substitute for obtaining water: reduction of water demand. Neither of these last two alternatives actually require nor consume water.

Water from a different river can be divided into two categories: water from Texas rivers and water from non-Texas rivers. Dow's experience and this paper will be limited to a brief discussion of water from Texas rivers. The ability to take water from non-Texas rivers, involves the interaction of another state's law and may well involve a great deal of politics. The Metroplex (Dallas–Fort Worth area) is experiencing both of these in their ongoing efforts to consume Oklahoma water. Texas has additional protections and requires additional showings in permitting the moving of water from one river basin to another.[19] This seems to be proper policy to avoid a water shortage in one area migrating and causing problems in other river basin(s). So while there may be permitting constraints, obtaining water from another river basin can provide a fairly independent LOP. However, often a drought is broader than one river basin. In 2011, most of Texas was in an extreme drought.[20]

It may be difficult to physically transfer the water from one river basin to the desired river basin. One way to accomplish this is to use existing infrastructure. If a municipality receives water from two river basins and has an interconnection that has sufficient additional capacity for the water user, this may be an economical way to transfer the water. Alternatively, if an existing pipeline happens to flow in the proper direction, purchase or use of an existing pipeline may be economical. Acquiring right-of-ways and constructing a pipeline is extremely expensive and may make obtaining such a LOP, even for a partial demand, too expensive.

Water rights have no impact on groundwater, which is regulated separately.[21] Groundwater can be purchased in two ways: 1) in the ground or 2) already extracted in a river. One buys groundwater in the ground from the land owner. However, the regulation of groundwater is delegated to the groundwater management district (sometimes known as the subsidence district) which has jurisdiction over the groundwater in a county or group of counties. Many groundwater management districts require a permit to "export" groundwater from

19. TEX. WATER CODE ANN. § 11.085 (West 2008 & Supp. 2012).

20. *Dried Out: Confronting the Texas Drought*, STATEIMPACT, http://stateimpact.npr.org/texas/drought/ (last visited Mar. 28, 2013) (showing the animated display of the drought through 2011).

21. *See generally* TEX. WATER CODE ANN. CH. 36 (West 2008).

the geographic area of the groundwater management district and may even require payment of a severance fee "export" the water.

One buys groundwater in a river from the person managing the water. This person can be the owner of the land that generated the groundwater. It can also be a person that first used the groundwater. The first user of the groundwater may be a municipality. If one is buying already used water (often called a return flow), many of the barriers to groundwater use may have been overcome.

In any event, one must use often use a bed and banks permit to transport the purchased water down a Texas river to the consumptive use location.[22] While it is not likely that any one groundwater source could substitute for the entire TXO water demand and become a LOP, acquiring groundwater that replaces some of the TXO water demand during periods of drought can function as a partial LOP.

Return flows back to a Texas river that was the water's source are subject to the priority system of water rights.[23] Typically, a municipal user has return flows equal to about 40% of their intake, since about half their water is used for watering outside plants. Irrigation use typically does not have return flows. Power generation typically recycle their water, using evaporative losses to provide cooling and only return a purge to the river, would have a very small return flow.[24] Return flows to another Texas river are subject to the permitting for interbasin transfers.[25] However, a return flow reused without entering a Texas river is not subject to the priority system of water rights.[26] TXO recently started to reuse the return flow from the city of Lake Jackson. This reuse replaces about 2,500 gpm of TXO's water demand. This is an example of a partial LOP. It operated during periods of drought, but also in the periods leading up to the drought, which may help keep the Harris and Brazoria reservoirs fuller than if the city of Lake Jackson reuse were not in place.

Given TXO's location at the end of the Brazos River, located by the United States government to allow easy shipment by boat during WWII, access to sea water from the Gulf of Mexico is not difficult. In fact, TXO already uses sea water as a partial replacement for fresh water, so this is already pumped to the site. Desalination is a very real, commercial process. It would allow TXO to manufacture the water it needs without being dependent on droughts and infringement by others of its water rights. A new, large desalination plant can produce water for a price of about $700/acre foot.[27] When the Brazos

22. TEX. WATER CODE ANN. § 11.042 (West 2009).
23. TEX. WATER CODE ANN. § 11.046 (West 2011).
24. Interview with Tim Finley, Senior Envtl. Eng'r, Dow Chemical (Mar. 27, 2013).
25. TEX. WATER CODE ANN. § 11.046.
26. *Id.*
27. Interview with Tim Finley, Senior Envtl. Eng'r, Dow Chemical (Mar. 27, 2013).

River is flowing at a sufficient rate (220 cfs) at the TXO Harris intake, the water is available for the cost of pumping the water down to the TXO plant and the maintenance of the water system ($40/acre foot).[28] When BRA interruptible water is available, as during a moderate drought, the current price is $62.50/acre foot.[29] Desalination, with its large price premium becomes a difficult to implement LOP.

The fifth alternative is a saltwater barrier. With the installation of a saltwater barrier, the amount of water flow in the Brazoria River needed to meet TXO's demand is decreased by about 100 cfs at the Harris Intake. This is because the normal function of 100 cfs passing the Harris Intake to keep the "salt water wedge" from reaching the Harris Intake and eliminating the ability for TXO to get good fresh water from the Brazos River is being replaced by a submerged, physical dam—the saltwater barrier.

The sixth alternative is reduction of water demand. TXO has aggressively reduced its water demand.[30] Including the reuse of the city of Lake Jackson water, TXO accomplished about 9,500 gpm of water reduction efforts at a cost identified as in excess of three million dollars. In addition, there were several water demand efforts that make sense to use during periods of extreme drought, these drought projects will reduce TXO's water demand by an additional 3,500 gpm. Again, each gpm of demand reduction enables the existing TXO infrastructure to operate better, providing a longer period of operation during a drought. These demand reduction projects can be viewed as an additional partial LOP. Water demand reduction did not stop with the projects claimed in the Texas Environmental Excellence Award application. In 2011, TXO purchased property upon which to double its reservoir capacity. While it takes many years to permit and construct a reservoir, doubling the capacity will have the effect of reducing TXO's water demand during short periods of droughts, adding an additional partial LOP.

C. *LOP in the Water Arena—Conclusion*

There does not appear to be a single adequate alternative supply for the TXO facility. However, every 10% reduction of TXO water consumption during drought periods increases the capacity of the Dow reservoirs by three days. It makes sense to look for a variety of alternative partial LOPs. Each of these partial LOPs may not be signifi-

28. Interview with Ernie Schreiber, Envtl. Operations, Dow Chemical (Mar. 28, 2013).

29. WATER SUPPLY CONTRACTS, BRAZOS RIVER AUTHORITY, http://www.brazos.org/water-contracts.asp (last visited Mar. 26, 2013).

30. *See* the Oct. 8, 2012 application for the Texas Environmental Excellence Award, which includes many details of these conservation efforts. TCEQ awarded Dow one (of ten) 2013 Texas Environmental Excellence Awards in a ceremony on May 2, 2013.

cant to the entire facility, but if a partial LOP's water source is diverse from the Brazos River there is at least a partial additional LOP, reducing the potential for TXO to run out of water. Note that the partial LOP of the saltwater barrier, while on the Brazos River, is diverse as it is not dependent on additional water flowing in the Brazos River.

V. Water Quality

There is a contentious issue in water rights law: water quality. One aspect of water rights is that the "first in time is the first in right."[31] This means that junior water rights are not allowed to be granted if their exercise might adversely impact senior water rights.[32] One concern is the amount of salt in the water that is allowed. One can wonder if a senior water right holder is able to make a call on the river if the quality of the river is adversely impacted by a junior water right holder. This might occur because a junior water right holder is taking water from a sweet tributary and allowing the salty tributaries to increase the salinity of the water reaching the senior water right holder. Alternatively, a junior water right holder with several reservoirs might during periods of low flow, release salty water from a high salt impoundment while impounding the same amount of sweet water into the junior water right holder's sweet water reservoir. This "trade" of water between the junior water rights holder might have the same effect as if the junior water right holder was discharging salt into the river. A third alternative is if a junior water right holder is taking sufficient water to allow a "salt water wedge" flow up stream until it adversely impacts the senior water rights intake.

A water rights holder has the right to have the same quantity and quality as when the water right was established.[33] The Brazoria Intake has the "salt water wedge" upriver from its location of river mile twenty five in the normal variation of the Brazos River and TXO does not make a call on the Brazos River to keep the Brazos River water as far down the Brazos River as the Brazoria Intake.

If there were no quality aspects of a water right, then TXO water rights would be meaningless, as the Gulf of Mexico water will fill any void left by misappropriated Brazos River water. Further, this TXO concern would then apply with equal vigor to the next water right up the Brazos River and so forth until the thwang (lowest part of the river bed) reaches sea level. We could construct arguments whether this was the high tide or the low tide levels. However, there is no support for the concept that in this area near the ocean, water rights disappear.

31. Tex. Water Code Ann. § 11.027 (West 2008).
32. Tex. Water Code Ann. § 11.1351 (West 2008).
33. Tex. Water Code Ann. § 11.001 (West 1997).

VI. WATER RIGHTS—ENFORCEMENT

Water rights have been enforced by making a call on the river and enforcing that call by suing the junior water rights holders that infringe the water rights of the calling senior water right holder.[34] While many theories might apply, typically a trespass legal theory is the one used to enforce water rights. TCEQ is the current state administrative agency charged with managing water rights.[35] TCEQ has police powers to enforce water rights for water rights holders.[36] There are a number of potential issues where TCEQ might decide to enforce a given water right in a manner different than that which the water right holder might pursue in a civil enforcement action. For example, there might be a water user that has a politically favored status ("Favorite") and that the TCEQ and/or the Senior might not want to deprive of water as the priority system would require. For the purposes of this paper, there is no need to distinguish among the various potential Favorites or the reasons for their political favor.[37]

For example, no responsible senior water right holder ("Senior") would desire to have the Favorite lack of water, caused by their application of their senior water rights against Favorite's water rights. Such a Senior might rationally prefer that the Favorite that failed to plan for sufficient water supplies should buy water from the Senior at the incremental cost of such water would generate if used by the Senior, rather than being force by the government to donate the water to the Favorite that failed to plan for sufficient water supplies. Depending on the particular facts, some Seniors might want to add a reasonable fee to the avoided benefit of the water. Depending on the price offered, the Favorite might be able to buy water from storage or another source senior to the Favorite and willing to sell at a lower price than that offered by the Senior. This is how goods are typically allocated in the United States and Texas.

Alternatively, the Senior might want to both share water with the Favorite and take their full priority of water. This has the effect of the Senior providing a gift of water to the Favorite and sticking someone else with the bill. The problem with this is it essentially expands the Senior's water rights by the amount of water provided to the Favorite,

34. TEX. WATER CODE ANN. § 11.041 (West 2008).

35. TEX. WATER CODE ANN. § 11.002(1) (West 2011) (defining "commission" as the Texas Natural Resource Conservation Committee ("TNRCC"). The TCEQ is the successor organization to the TNRCC, starting in 2002, as part of the legislative sunset review of all state agencies. *See* HISTORY OF THE TCEQ, TCEQ, http://www.tceq.texas.gov/about/pre_agency_flow.html/at_download/file (last visited March 27, 2013); *see also* TEX. WATER CODE ANN. § 5.014 (West 2011)).

36. TEX. WATER CODE ANN. §§ 5.102, 5.120, 5.122, 11.139 (West 2008).

37. Examples of such politically favored water users might include: a Senior's parents' ranch or business, the ranch or business of someone upon which the Senior's business depended, the Senior's church, a city, a electrical power generator and the legislature.

as the burden of this favor is shifted to junior water rights holders, see future discussion for more details. There are other situations where similar cases of shifted favor burdens occur.[38] Some may say that the courts or TCEQ will not allow a Senior to double count its water rights in this way. The result is the same if the courts or the TCEQ carve out an exception for their Favorite, which has occurred, so the discussion of this issue continues.

This problem is exasperated when we add to the situation a junior water right holder ("Junior"), whose priority is between that of the Favorite and the Senior. This Junior and the Favorite both should have their water rights cut off, at least in part, by the priority of the Senior. If both should have been cut off completely and the Senior provides water out of priority, the Junior is not adversely impacted. This is indistinguishable to the Junior from the circumstance where the Senior consumed the water itself. The only concern is if the Senior is forced to share, the state is taking the Senior's water, without compensation.

To assist illustrating the problem being discussed, consider the river having a water flow of 1,000; the Senior a water demand of 600; a Favorite a water demand of 200 and the Junior a water demand of 500. Clearly the Junior's entire water demand of 500 is at risk to the priority claim of the Senior. However, the Senior's priority claim is only to the extent of the Senior's water need. In this case, the Junior should receive 400 of its water demand, which is the 1,000 in the river minus the 600 of the Senior. However, from the Junior's perspective, the Favorite's water demand of 200 has now assumed the priority of the Senior's water right, since the Junior only receives a water flow of 200: the same effect as if the Senior had inappropriately increased its water right by the 200 of Favorite.

38. One that comes to mind is when there is a long line of cars on a road with a stop light that is allow few to proceed each cycle and many are backed up. A new car on a side street with a stop sign pulls up and stops. Rather than following the traffic laws, a car which is about to proceed through the stop light, stops and motions the car behind the stop sign to move forward. This favor imposes a delay of two cars to the rest of the cars behind the favor granting car, as it takes longer to have the side street car proceed than it would have to have the cars already on the stop lighted road proceed. The driver of the car granting the favor feels better, but they have violated the driving laws, extended the traffic jam longer than it would have been if the traffic laws were followed and pushed the vast majority of the time delay cost of the favor on to each and every driver of the cars that are in line on the stop lighted street. This is something for drivers to consider when driving, particularly when driving in front of the author on a stop light stopped street.

While the Author is not saying that granting the side street car a favor is evil, there is a cost of this favor that is not born by the one granting the favor. The traffic laws were generated to promote safe driving and move traffic quickly. Any undermining of them should be as carefully considered as undermining the water priority laws. When people act in ways contrary to the established requirements, unintended consequences, such as auto accidents and removing incentives for Favorites to adequately plan and manage water before and during droughts may occur.

One can suggest that water right priority is being followed since the only Junior(s) who are curtailed are those whose water rights are junior to Senior and Senior is not impacted. However, this is simply false, as the burden of the favorable treatment of Favorite has been passed on to the Junior(s). This is the same as the footnote 38 case, where the car allowing the stop signed car gets through the stop light without having to wait another cycle, it is just the entire trail of cars stopped behind the favor granting car that are burdened with an additional two car time delay.

A. *Recent Enforcement History*

Though the rules and practices are changing, TCEQ has enforced the recent calls with Favorites. This has been criticized as violating the priority system. We can all agree that there should be certain Favorites. The questions are: 1) who is a Favorite 2) what aspects of a Favorite's water demand should be favorably treated, 3) what demonstration should be required for Favorite treatment, 4) what efforts should be required of the Favorite to continue the Favorite treatment and 5) how are these previous four questions answered.[39] There needs to be an understanding of the appropriate Favorites and associated conditions.[40] It might be entirely appropriate to have Favorite treatment only occur once a potential Favorite attempted to solve its water shortage issue by appropriately attempting to purchase water from those Junior(s) who will carry the burden of providing the water to the Favorite. Otherwise, the Junior(s) are being forced to fund the Favorites, and the normal incentives for the Favorites to manage potential water shortage issues, that exist for the non-Favorites, are removed.

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39. Examples of potential Favorite(s) include: cities, power generators, water providers to cities and power generators and reservoirs of water providers to cities and power generators.

Examples of water uses that might be excluded include ornamental watering, water consuming maintenance that can be delayed, increase cycle time for water, implement city water plan.

Examples of activities that might be required to keep Favorite status include: greater planning for future water demands, perhaps acquiring more water contracts—buying water from those Juniors that were cut off in prior years, reduce Favorite water demand towards best in class performance, that is measured and reported by TCEQ.

40. Continuing the driving analogy, many might agree that it would be appropriate for the favor to be granted to an ambulance on the stop street. Others might desire the additional requirement that they are in an urgent situation and using their emergency lights to get the favor. In any event, it makes sense to have the conditions for such Favorite treatment spelled out in the traffic laws and not require ad hoc decisions to be made each time one is driving down a street where the traffic is stopped by a light and a car stopped by a stop sign presents a Favorite situation.

B. *Future*

Texas is growing at an unprecedented rate and appears, as always does in the middle of movements, to be poised to continue growing for a fairly long time. With this increase in population and associated changes the needs of Texas and various Texas citizens will change. This change will create problems, obstacles and opportunities. All of this is well known. However, as applied to Texas water law, it doesn't appear that there is any need to not continue to follow the existing water law and have new Texans buy water from those that already have the water rights, or create new water for consumption, through additional storage or use of groundwater, where available. When the US Government built the TXO and Dow assumed the operation of the facility, water rights were purchased from existing water right holders at an agreed price. With these purchases Dow assumed the priority of the former water right holder and the former water right holder enjoyed the benefits from the price paid for their former water rights. Cities need to compete among themselves in terms of roads, weather, location to various jobs and universities, as well as in the provision of water. If one city can manage to provide water for itself at a substantially cheaper price, this should become no less of a differentiation factor than the time one takes to drive to work. The same is true for power generation. No one would consider that the labor laws should not apply to the cities and power generators or other Favorite(s). Emergency rules should be used to apply to emergencies, not just to the demands of Favorite(s). The Texas rivers provide a means to easily transport water so there should be a wide open market for groundwater and additional stored water sufficient to change the use or non-use of resources or to induce investment in facilities to deliver the water that will be needed.

VII. Conclusion

Water law is changing, responding to the growing population of Texas and related changing needs. Just as we do not take a farmer's property next to a growing city without compensation and due process of law, water should also be distributed largely by following the existing law and capitalistic distribution system used to distribute most goods and services in Texas and the United States.

TCEQ – Questions for Senior Water Right Holder Making Call

Contact Information

What is the name of the city, public water supply system, or water right holder?

The Dow Chemical Company

Who is the primary contact? Phone number, address, email?

Julie Woodard
The Dow Chemical Company
2301 N. Brazosport Blvd, Bldg B-101
Freeport, TX 77541
979-238-1726 (Office); 979-665-6452 (Cell)

jwoodard@dow.com

What county are you in?

Brazoria County

If a public water system, how many connections do you have?

NA

Sources of Water

What is your primary source of water? What is the name of the stream, lake, or aquifer?

Brazos River

Do you have alternate sources of water?

No

How much storage do you have? How many days supply is it?

Brazoria Reservoir: 21,000 acre-ft, 30 days capacity when full

Harris Reservoir: 7,000 acre-ft, 15 days capacity when full

What permit(s) are you making your call under? What priority date?

Certificate of Adjudication 12-5328

February 28, 1929: 20,000 acre-ft/year
February 14, 1942: 150,000 acre-ft/year
April 4, 1960: 65,000 acre-ft/year
March 8, 1976: 3,136 acre-ft/year

What provision(s) in your permit is not being met under current conditions?

Permitted withdrawal rate is 662 cfs, current withdrawal rate is 290 cfs

What amount of water have you used under your permit(s) to date this year?

Water usage year-to-date is 93,405 acre-ft, 1/1/2012 thru 10/31/2012. This amount includes water diverted for use by the Brazosport Water Authority under their water right.

Do you have or can you get a water supply contract?

Yes, BRA is selling interruptible water

What other public water systems are located nearby, if applicable?

NA

System Needs

What is the minimal amount your system/customers need for basic functions? Please answer in cubic feet per second (cfs), acre-feet, or another measurement method as appropriate.

290 cfs is needed when refilling the reservoir

180 cfs is needed when depleting the reservoir

What level of streamflow is required to make your diversions or maintain your uses?

Minimum flow at the Rosharon gage needs to be at least 325 cfs, as a minimum point in any 24-hour period. Of this 325 cfs, 100 cfs flow margin is needed to manage the location of the salt wedge below the Harris intake.

What is your average daily usage?

Average daily usage is 306 acre-ft

What is your minimum needed daily demand?

Current daily consumptive demand is 225 cfs

How many days of water do you have remaining?

We currently have 41 days of reservoir storage

DEPARTMENT OF THE ARMY PERMIT

Permittee The Dow Chemical Company

Permit No. SWG-2012-00196

Issuing Office Galveston District

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: To install a low sand berm (12,000 cubic yards) across the Brazos River Channel, armored with gravel (1,000 cubic yards) to protect against immediate erosion. The berm would be installed below the Ordinary High Water Mark to allow fish passage and navigation by small craft. The project will be conducted in accordance with the attached plans, in 4 sheets.

Project Location: The project site is located in the Brazos River, off Harris Reservoir Road in Angleton, Brazoria County, Texas. The project can be located on the U.S.G.S. quadrangle map titled: EAST COLUMBIA, Texas.
Approximate UTM Coordinates in NAD 83 (meters): Zone 15; Easting: 250953.1614; Northing: 3237648.3489.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on 31 December 2018. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

ENG FORM 1721, Nov 86 EDITION OF SEP 82 IS OBSOLETE. ***(33 CFR 325 (Appendix A))***

1

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

1. The permittee understands and agrees that, if future operations by the U.S. require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the U.S. No claim shall be made against the U.S. on account of any such removal or alteration.

2. The permittee must install and maintain, at their own expense, any safety lights and signals prescribed by the U.S. Coast Guard (USCG) through regulations or otherwise on the authorized facilities. The USCG may be reached at the following address: Commander (dpb), Eighth Coast Guard District, Hale Boggs Federal Building, 501 Magazine Street, New Orleans, Louisiana 70130-3396, or by telephone at 504-589-6198.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

(X) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General Condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps of Engineers will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

(PERMITTEE) 4/3/2013 *(DATE)*

THE DOW CHEMICAL COMPANY

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

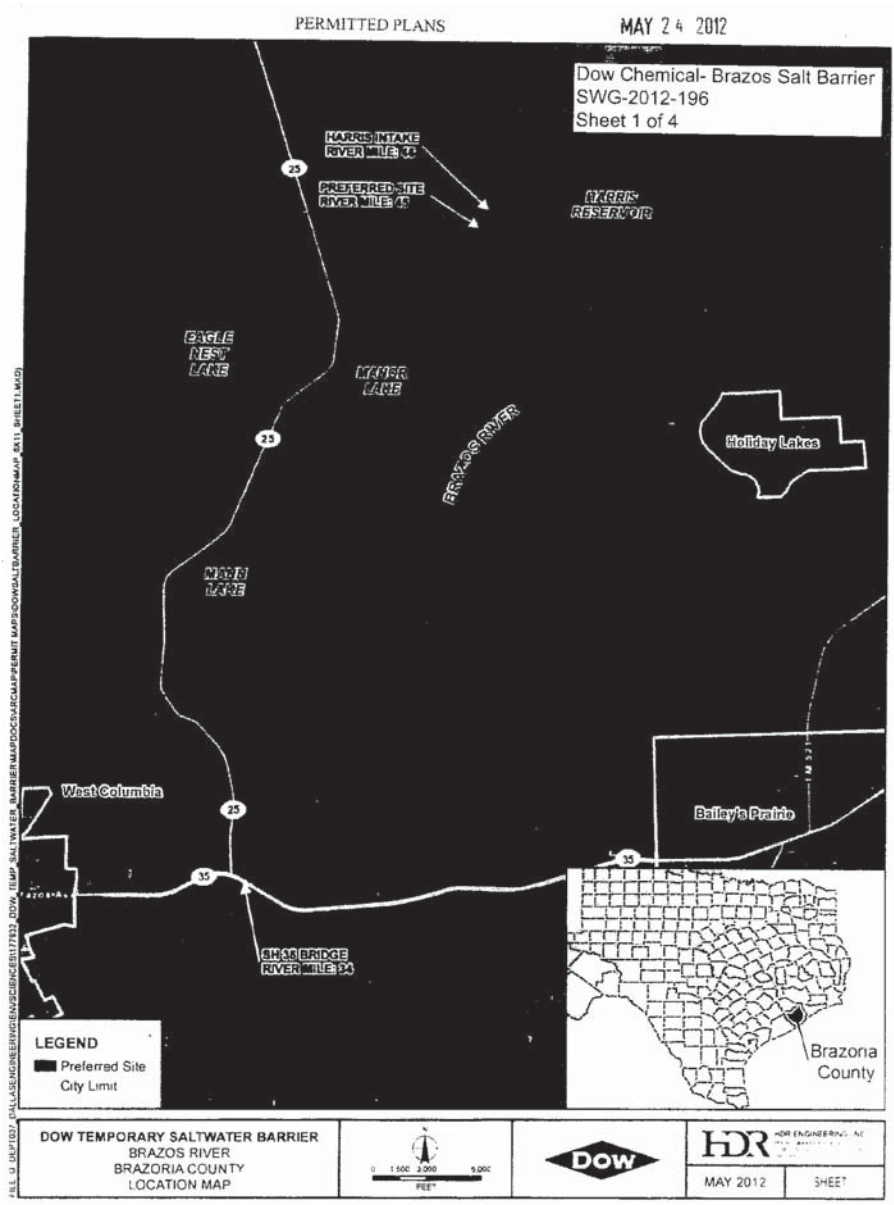
(DISTRICT ENGINEER) 3 April 2013 *(DATE)*

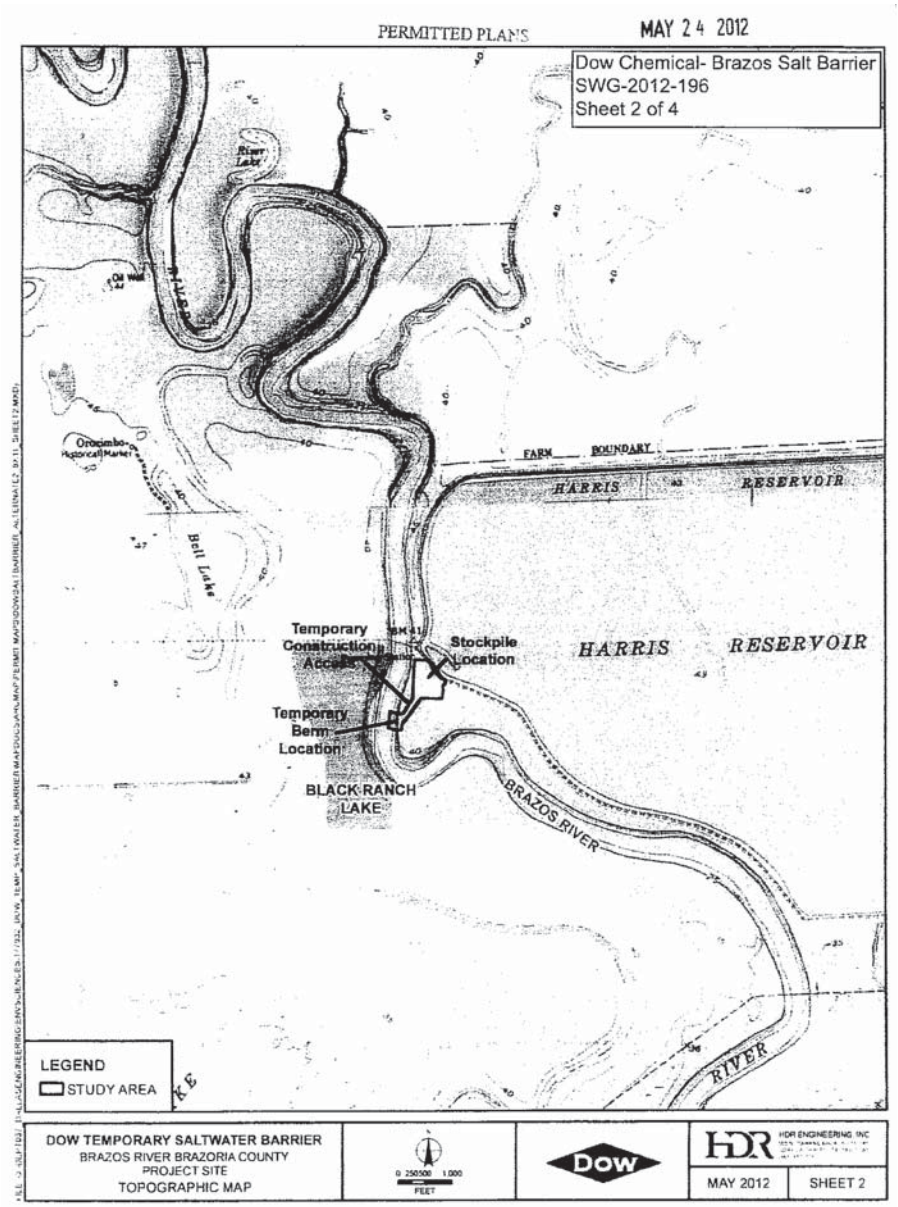
KRISTI N. MCMILLAN
LEADER, CENTRAL EVALUATION UNIT
FOR COLONEL CHRISTOPHER W. SALLESE

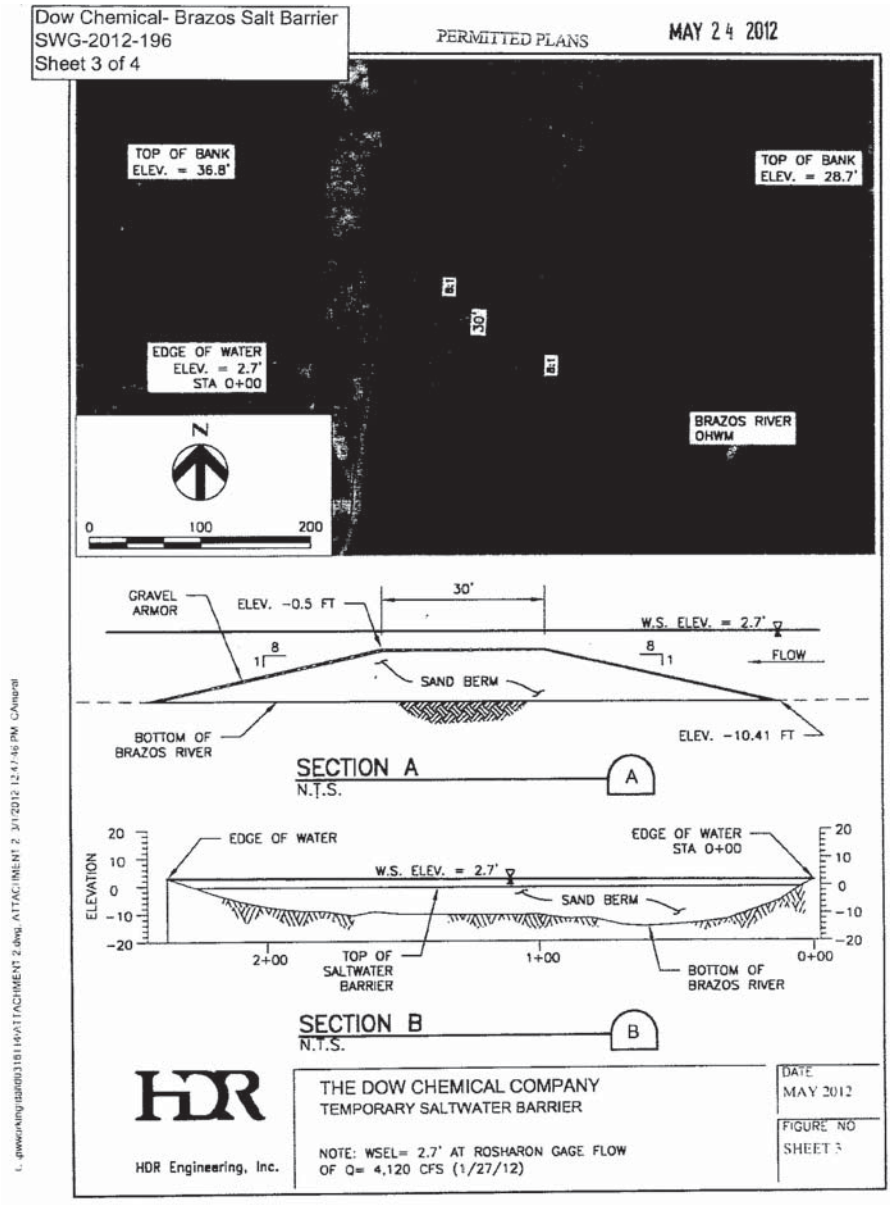
When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

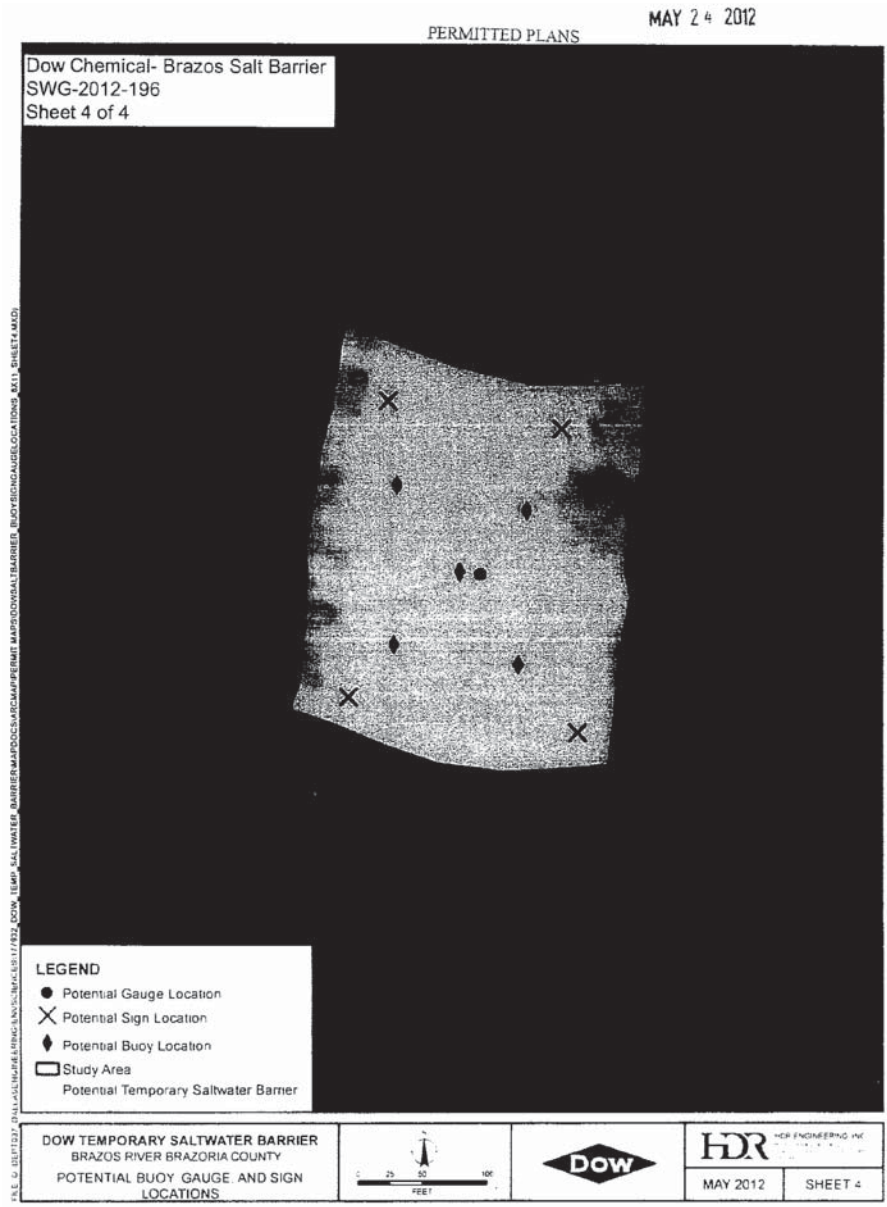
(TRANSFEREE – Typed/Printed Name) *(DATE)*

(TRANSFEREE - Signature) *(Mailing Address)*


PERMITTED PLANS
MAY 24 2012
Dow Chemical- Brazos Salt Barrier
SWG-2012-196
Sheet 1 of 4
HARRIS INTAKE
RIVER MILE: 39
PREFERRED SITE
RIVER MILE: 43
HARRIS RESERVOIR
EAGLE NEST LAKE
MEMORIAL LAKE
BRAZOS RIVER
Holiday Lakes
MAGNOLIA LAKE
West Columbia
Bailey's Prairie
SH 35 BRIDGE
RIVER MILE: 34
LEGEND
Preferred Site
City Limit
Brazoria County
DOW TEMPORARY SALTWATER BARRIER
BRAZOS RIVER
BRAZORIA COUNTY
LOCATION MAP
DOW
HDR
MAY 2012
SHEET


PERMITTED PLANS
MAY 24 2012
Dow Chemical- Brazos Salt Barrier
SWG-2012-196
Sheet 2 of 4
FARM BOUNDARY
HARRIS RESERVOIR
Bell Lake
Temporary Construction Access
Stockpile Location
Temporary Berm Location
BLACK RANCH LAKE
BRAZOS RIVER
LEGEND
STUDY AREA
DOW TEMPORARY SALTWATER BARRIER
BRAZOS RIVER BRAZORIA COUNTY
PROJECT SITE
TOPOGRAPHIC MAP
0 250500 1000
FEET
Dow
HDR
HDR ENGINEERING INC
MAY 2012
SHEET 2


Dow Chemical- Brazos Salt Barrier
SWG-2012-196
Sheet 3 of 4
PERMITTED PLANS
MAY 24 2012
TOP OF BANK
ELEV. = 36.8'
TOP OF BANK
ELEV. = 28.7'
EDGE OF WATER
ELEV. = 2.7'
STA 0+00
BRAZOS RIVER
OHWM
N
0
100
200
GRAVEL
ARMOR
ELEV. -0.5 FT
30'
W.S. ELEV. = 2.7'
FLOW
SAND BERM
BOTTOM OF
BRAZOS RIVER
ELEV. -10.41 FT
SECTION A
N.T.S.
A
ELEVATION
EDGE OF WATER
EDGE OF WATER
STA 0+00
W.S. ELEV. = 2.7'
SAND BERM
2+00
TOP OF
SALTWATER
BARRIER
1+00
0+00
BOTTOM OF
BRAZOS RIVER
SECTION B
N.T.S.
B
HDR
HDR Engineering, Inc.
THE DOW CHEMICAL COMPANY
TEMPORARY SALTWATER BARRIER
NOTE: WSEL= 2.7' AT ROSHARON GAGE FLOW
OF Q= 4,120 CFS (1/27/12)
DATE
MAY 2012
FIGURE NO
SHEET 3


PERMITTED PLANS
MAY 24 2012
Dow Chemical- Brazos Salt Barrier
SWG-2012-196
Sheet 4 of 4
LEGEND
Potential Gauge Location
Potential Sign Location
Potential Buoy Location
Study Area
Potential Temporary Saltwater Barrier
DOW TEMPORARY SALTWATER BARRIER
BRAZOS RIVER BRAZORIA COUNTY
POTENTIAL BUOY GAUGE AND SIGN LOCATIONS
0 25 50 100
FEET
DOW
HDR
MAY 2012
SHEET 4

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: The Dow Chemical Company	File Number: SWG-2012-00196	Date: 04/03/2013
Attached is:		See Section below
X	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
	APPROVED JURISDICTIONAL DETERMINATION	D
	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/CECW/Pages/reg_materials.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

-

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION

If you have questions regarding this decision and/or the appeal process you may contact: Mr. Steven E. Walls, Project Manager CESWG-PE-RE, P.O. Box 1229 Galveston, Texas 77553-1229 Telephone: 409-766-3125; FAX: 409-766-6301	If you only have questions regarding the appeal process you may also contact: Mr. Elliott Carman Administrative Appeals Review Officer (CESWD-PDO) U.S. Army Corps of Engineers 1100 Commerce Street, Suite 831 Dallas , Texas 75242 469-487-7061 (phone)

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

2013 Texas Environmental Excellence Awards Application

Application must be postmarked or submitted online by October 5, 2012.

Please complete the following information, as applicable, when submitting your environmental project for consideration in the 2013 Texas Environmental Excellence Awards competition. Type size should be no smaller than Times New Roman 10-point or comparable. Please submit only one application per project. If mailing, send **two additional copies** of each. **Do not send additional support materials.** (You may be asked to submit additional materials later.) See Application Instructions & Requirements for guidelines on filling out the application. You may submit the application online at <www.teea.org>.

GENERAL INFORMATION Date: 10/08/12

Company/Organization Name *The Dow Chemical Company, Texas Operations*		
Type of Business or Organization *Chemical manufacturing and research*		
Business Subsidiary of *N/A*	No. of Employees/Members *4,000 employees + 4,000 contractors*	
Customer Reference Number (*if applicable*) *CN600356976*	Regulated Entity Reference Number (*if applicable*) *RN100225945*	
Contact Person & Title *Fran Falcon, EH&S Leveraged Delivery Leader*		
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E-mail Address *fqfalcon@dow.com*		
Web site Address *www.dow.com*		
Total Number of Applications Submitted *1*		
Award Category (*Final determination made by the TCEQ*)		
☐ Innovative Operations/Management	☐ Civic/Community	☐ Youth
☒ Water Conservation	☐ Education	☐ Individual
☐ Pollution Prevention	☐ Agriculture	
Use Form T for Technical/Technology projects.		

1. Name of project or individual: Site Water Conservation Projects

2. **Describe the project in detail (date of event(s), site(s), number of people participating, purpose, goals, history, accomplishments to date, etc). What type of environmental improvement was made, and how was the improvement accomplished?** (Describe in 600 words or less.)

The Dow Chemical Company's Texas Operations site covers 5,000 acres of manufacturing and is located at the end of the Brazos River. The site is comprised of approximately 60 production plants and several research facilities that rely on the use of freshwater, as well as salt water. With the drought in 2011 and the need to purchase water, it became clear that the way we think about water had to change and that conservation of freshwater was needed.

The site conducted a Water Summit in November of 2011 to brainstorm project ideas for supply, demand, and storage. Participants came from other sites in Texas, as well as from our corporate headquarters in Michigan. To further prioritize and address the more than 200 project ideas resulting from the summit, a Water Strategy Director was named and a steering team appointed. A targeted reduction of 10,000 gpm of freshwater use was established.

The site also initiated a contest among the facilities on the site in September 2011 to raise drought awareness (local rain may help our lawns, but has very little impact on the flow in the Brazos) and identify water conservation opportunities. Thirty-seven suggestions were generated and entered into a matrix to score based on water conservation potential, feasibility, and ease of implementation. As Texans love BBQ, this was the 'prize' for the best project selected. The Trichlor facility won with a project opportunity to install piping that reduced their water use by approximately 400 gpm.

In addition to the company's Water Summit, a Water Symposium was held in May 2012 with the Brazoria County Petrochemical Council. More information on the Water Symposium is available in question 6.

As a result of all these efforts, several water conservation projects were identified. Many have been implemented, and others are in the process of being implemented. A brief description of the completed projects follows.

Chlorine Once Through Cooling Water Recycle – This project recycles the once through cooling water for the rectifiers at one of the chlorine plants, as well as the once through cooling water for an air compressor station. This project is being implemented in two phases. Phase I is complete and Phase II is in progress.

Elimination of One Pass Fire Water Monitor Cooling at Power 6 – Piping was installed to allow for the use of seawater for cooling saving 200 gpm of continuous freshwater use and 200-600 gpm during startups and shutdowns.

Demin Water Plant Resin Change – This project significantly improves the operation of a resin bed, as well as modifications to a reservoir to maintain the gains in efficiency.

Power 3 Supplemental Cooling Automation – The project scope was initially to change from water cooling to air cooling for a section of a power plant that required intermittent cooling. However, there was insufficient space to install the required fin-fan exchangers. So alternate plan was developed to slightly modify existing equipment and implement process control to allow for the automation of the cooling water valve.

Cooling Tower Chemistry – Dow worked with their water treatment chemical provider to modify the water treatment chemistry on 25 cooling towers to reduce makeup water by 400 gpm.

Soft Water Recycle – This project installed piping, valves, flow meters and other instrumentation to recycle soft water from a propylene oxide plant to the site river water header when only two trains are running saving 3,000 gpm.

Improving the maintenance of many of our older river water lines has resulted in the reduction of another 1,000 gpm. An additional 3,500 gpm was saved by eliminating slab washing and watering landscaping.

3. **Is this project innovative or creative in its use of technology or personnel? If so, please explain.** (Explain in 100 words or less.)

As mentioned in question 2, the site initiated a contest to tap into the brains of over 4,000 employees to identify water conservation projects. Another innovation involved how projects are evaluated financially. Historically, water conservation projects are evaluated based on the cost of water. However, the costs associated with the loss of product are substantially higher when plants are forced to shut down due to no water being available. Changing how water conservation projects are evaluated allowed for the approval of these projects.

4. **Describe how the project benefits the environment (for example, how it conserves water, reduces waste or pollution, improves air or water quality). Does it serve as a model for other projects?** (Describe in 100 words or less.)

Most of the projects listed have sustainable benefit to the environment by the permanent reduction in freshwater consumed. Permanent piping was installed to make the project sustainable even if only used during a drought. The implementation of these projects serves as a model for site. To ensure the ability to capture and store more water when river flows are high, additional pumping capacity was installed. New plants are being designed and built integrating water minimization and recycle.

5. **How do you specifically measure the success of the project? (Include hard numbers such as: gallons of water conserved, pounds of diverted waste or resources conserved, cost savings, year-to-year comparison, etc.)** (Describe in 100 words or less.)

Success is measured in sustainable reductions of water use: gallons per minute (gpm). In addition to the projects below, temporary water conservation measures resulted in the reduction of 3,500 gpm.

Project Title	Water Reduction (gpm)
City of Lake Jackson Waste Water Re-Use	2,500
Chlorine Once Through Cooling Water Recycle (Phase I)	1,300
Dorr Pond Water Reduction	400
PO Soft Water Recycle	3,000
Demin. Water Plant Resin Change	1,600
Elimination of One Pass Fire Water Monitor Cooling at Power Plant	200-600
Power 3 Supplemental Cooling Automation	400
TOTAL	**9,400-9800**

6. **Describe any educational, training, or outreach component to your program (brochure, video, manual, classes, seminars, etc.). Have you worked with another school, city, or other organization to help them establish a similar program?** (Describe in 100 words or less.)

Dow hosted the Brazoria County Petrochemical Council's May 2012 Water Symposium focusing on how critical freshwater is Brazoria County and Texas. Jason Afinowicz from the Region H Water Planning Group, TCEQ Commissioner Carlos Rubinstein and representatives from state government, Brazoria County, area municipalities, Brazosport Water Authority, local petrochemical companies, the Brazosport Area Chamber of Commerce and Dow discussed water conservation and provided education and awareness on the Texas water plan and water rights.

7. **Does this project involve the cooperation of different types of public, private, community, business, or citizen groups? If so, please explain the cooperative effort(s) and list all participating entities and their respective roles.** (Describe in 100 words or less.)

Dow collaborated with the City of Lake Jackson and the TCEQ on a project to re-use the city's waste water. To ensure there would be no adverse effects on Dow's processes, Dow worked closely with the city to evaluate the quality of this water. TCEQ's Office of Water expedited issuance of the Water Re-Use Permit for this project. This 2,500 gpm of water is now used by Dow.

8. **Estimate the cost of the project. Give specifics, if applicable.** (Give specifics in 100 words or less.)

Project Title	Project Scope	Project Cost
City of Lake Jackson Waste Water Re-use	Canal and culvert work	$25,000
Chlorine Once Through Cooling Water Recycle (Phase I)	Pump and piping	$1,400,000
Dorr Pond Water Reduction	Lined piping	$150,000
PO Soft Water Recycle	Piping, valves, instruments	$250,000
Demin. Water Plant Resin Change	New resin	$1,200,000
Elimination of One Pass Fire Water Monitor Cooling at Power Plant	Piping, valves	$10,000
Power 3 Supplemental Cooling Automation	Instrumentation, process control	$10,000
TOTAL		**$3,045,000**

9. **Describe anything exceptional about your project (For example, does your project: self-sustain financially; go above and beyond legal requirements; address issues of environmental equity; result in a significant positive impact to the environment; or take place in a critical region, such as the Rio Grande border area or a National Ambient Air Quality Standards nonattainment or near nonattainment area?)** (Describe in 100 words or less.)

All but one of the projects implemented are self-sustaining financially. The one project simply requires periodic removal of vegetation and dredging to extend a resin's life. All the projects exceed legal requirements in a critical water planning region (the Brazos River) as continued population growth increases river demand. The projects also occur during a critical drought.

10. **Briefly describe the schedule or timetable of the project, including the start date and dates of any major milestones. Will this be an ongoing project? What additional resources and/or activities would allow you to improve this project?** (Describe in 100 words or less.)

The drought in 2011 highlighted the on-going issue of fresh water availability. Several projects are in being engineered or constructed.

Project Title	Engineering Start Date	Project Start Up Date
City of Lake Jackson Waste Water Re-use	Aug 2011	Oct 2011
Chlorine Once Through Cooling Water Recycle (Phase I)	Nov 2011	Dec 2011
Dorr Pond Water Reduction	Nov 2011	Aug 2012
PO Soft Water Recycle	Feb 2012	Sept 2012
Demin Water Plant Resin Change	March 2012	Aug 2012
Elimination of One Pass Fire Water Cooling	June 2011	Oct 2011
Power 3 Supplemental Cooling Automation	Aug 2012	Sept 2012