HESS CORPORATION
500 Dallas Street
Houston, TX 77002

J. B. Fowler
Director, Project Operations
Unconventional Developments
(713) 609-5962

April 14, 2011

Pamela Bush, Esquire
Commission Secretary
Delaware River Basin Commission
P.O. Box 7360
25 State Police Drive
West Trenton, NJ 08628

Subject: Comments on the Draft "Natural Gas Development Regulations" – Article 7 of Part III – Basin Regulations – dated December 9, 2010.

Dear Ms. Bush,

Hess Corporation appreciates the opportunity provided by the Delaware River Basin Commission to review and provide input on the Draft Natural Gas Development Regulations (Article 7). We believe the Commission's proposed regulations could be a positive step forward toward the sustainable development of shale gas resources in the Delaware River Basin. However, in our view certain modifications, primarily related to the application of site specific risk-based mechanisms to avoid or mitigate potential impacts, would allow increased efficiency and flexibility in responsibly developing natural gas resources and in protecting water resources within the Basin. This letter supplements the ALL Consulting Independent Analysis Report referred to below and highlights our priorities for your consideration.

1. About Hess

Hess Corporation is a leading global independent energy company with exploration, production, marketing and refining operations. With exploration and production operations ranging from Equatorial Guinea to the Gulf of Mexico and Indonesia to the North Sea, Hess is delivering long-term profitable growth. As the company plans for future growth, Hess is focused on developing unconventional resources. With unconventional opportunities in North Dakota's Bakken region, Paris Basin, the Eagle Ford in Texas and Marcellus in Pennsylvania, Hess Corporation is poised to become a top-quartile industry leader.

2. Hess in the Delaware River Basin

In 2009, the company acquired leases for 80,000 net acres of privately-held land in northeast Pennsylvania. In 2010, Hess entered into a 50/50 joint venture with operator Newfield Exploration to develop 60,000 gross acres in the eastern portion of the Marcellus area. Hess also has under lease another 55,000 acres separate from the joint venture. With DRBC's consent the company drilled two vertical exploration wells in the Basin in 2010, neither of which was hydraulically fractured. We understand that any future drilling and development of our acreage

within the Basin will be subject to regulation by the Pennsylvania Department of Environmental Protection (PADEP), the DRBC and the Pennsylvania Department of Transportation (PennDOT) with certain aspects regulated by other federal, state and local agencies.

As part of our compliance management system during 2009 and 2010, we monitored regulatory developments and attended multi-stakeholder and industry association meetings. We also met with the PADEP, DRBC, SRBC, PennDOT and municipal authorities to ensure our plans met all applicable regulations and were conducted according to the highest standards of corporate citizenship. At the local level, we consulted with landowners to understand their concerns and address how regulations might impact their expectations for siting wells and associated infrastructure on their property.

3. ALL Consulting Independent Analysis Report

Hess participated in the development of and concurs with the comments and recommendations in the Independent Analysis Report prepared by ALL Consulting (ALL) and submitted to the DRBC. We recommend DRBC consider the results and recommendations identified in ALL's analysis, in addition to those identified within this supplemental review when finalizing the regulations.

4. Hess Priorities

Hess supports establishing regulations that will enable responsible development of shale gas resources in the Basin to proceed. The following sections provide an overview of elements within the proposed Article 7 regulations that are priorities to Hess:

4.1. Siting Constraints and Setbacks

The DRBC's proposed regulations contain siting constraints that restrict development of the majority of Hess' acreage in Pennsylvania without first obtaining a regulatory variance, the process for which is currently not defined. These constraints are in addition to existing state regulations that specify setbacks and require the use of Best Management Practices (BMPs) to protect water quality.

Provisions under 7.5(b)(3) and 7.5(b)(4) restrict natural gas development within Flood Hazard Areas, on slopes greater than 20%, and within 500 ft from water bodies, wetlands, water supply reservoirs and surface water intakes. These constraints restrict development of approximately 60% of Hess' operated acreage **(Figure 1)**. Provisions that underpin the well pad Approval by Rule (ABR) process under 7.5(e) restrict an additional 30% of Hess's total operated acreage **(Figure 2)** by requiring an incremental variance (approval).

Hess understands and supports the intent of siting restrictions as a means of water quality protection; as noted however, many host states use case-by-case risk analysis to ensure protection of water resources. **Figure 3** compares well setback requirements in other US unconventional resource development jurisdictions.

In addition to respective setback requirements, Pennsylvania and New York require Erosion and Sedimentation permits for oil and gas activities. These permits require plans that describe operational practices (BMPs) that will be used to reduce the potential for sedimentation and earth disturbance based on site specific characteristics.

Neither Texas nor North Dakota prescribe setbacks for water bodies or wetlands at the State-level. Instead they rely on BMPs based on site specific characteristics to issue permits that mitigate impacts and protect water resources.

Our view is that optimal protections of Basin water resources will be achieved through the use of risk-based, responsible operating practices rather than through inflexible and industry-specific land use restrictions.

Figure 1: Natural Gas Development Plan – Siting Restrictions and Setbacks

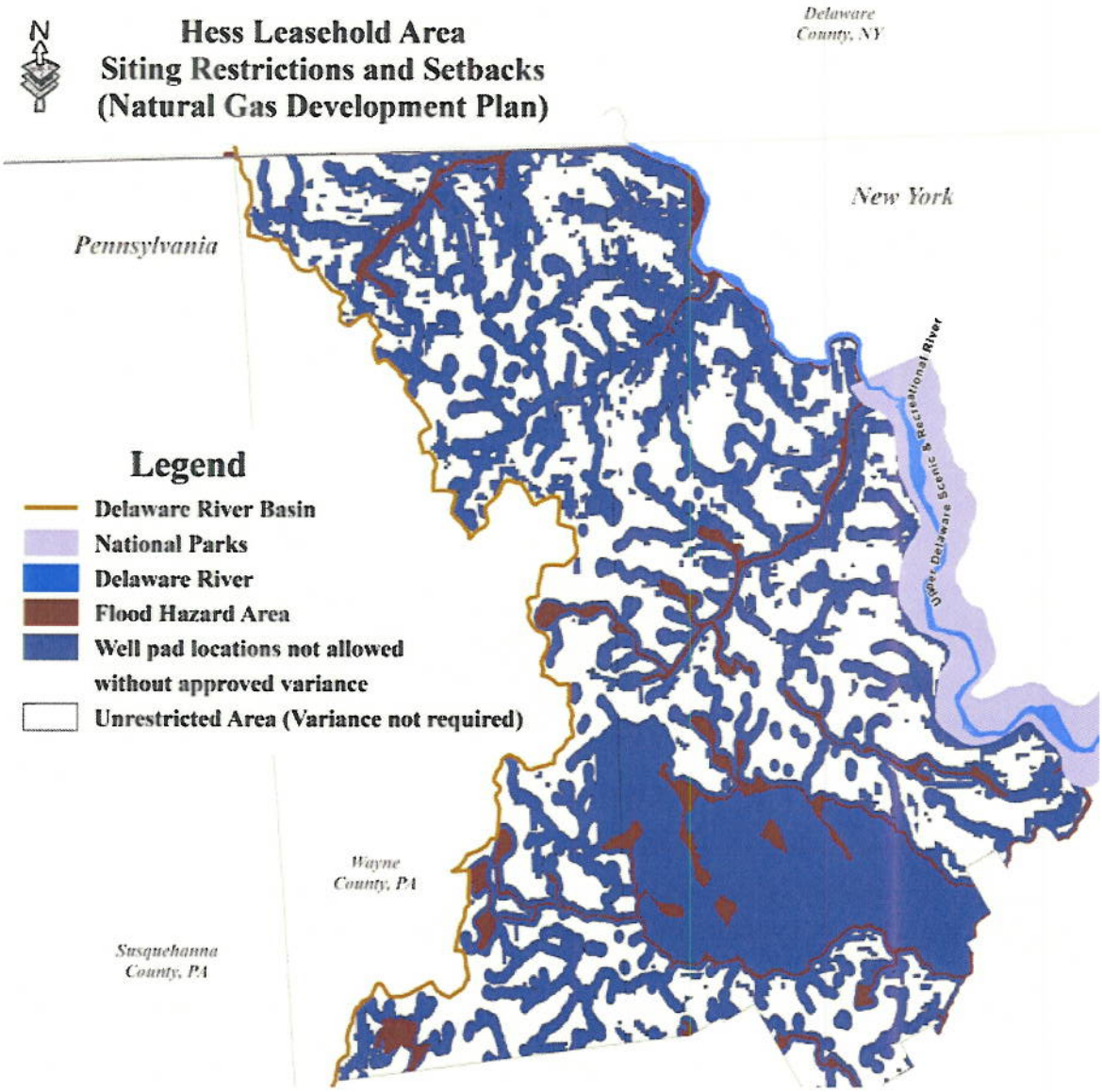


Figure 2: Approval-by-Rule – Siting Restrictions and Setbacks

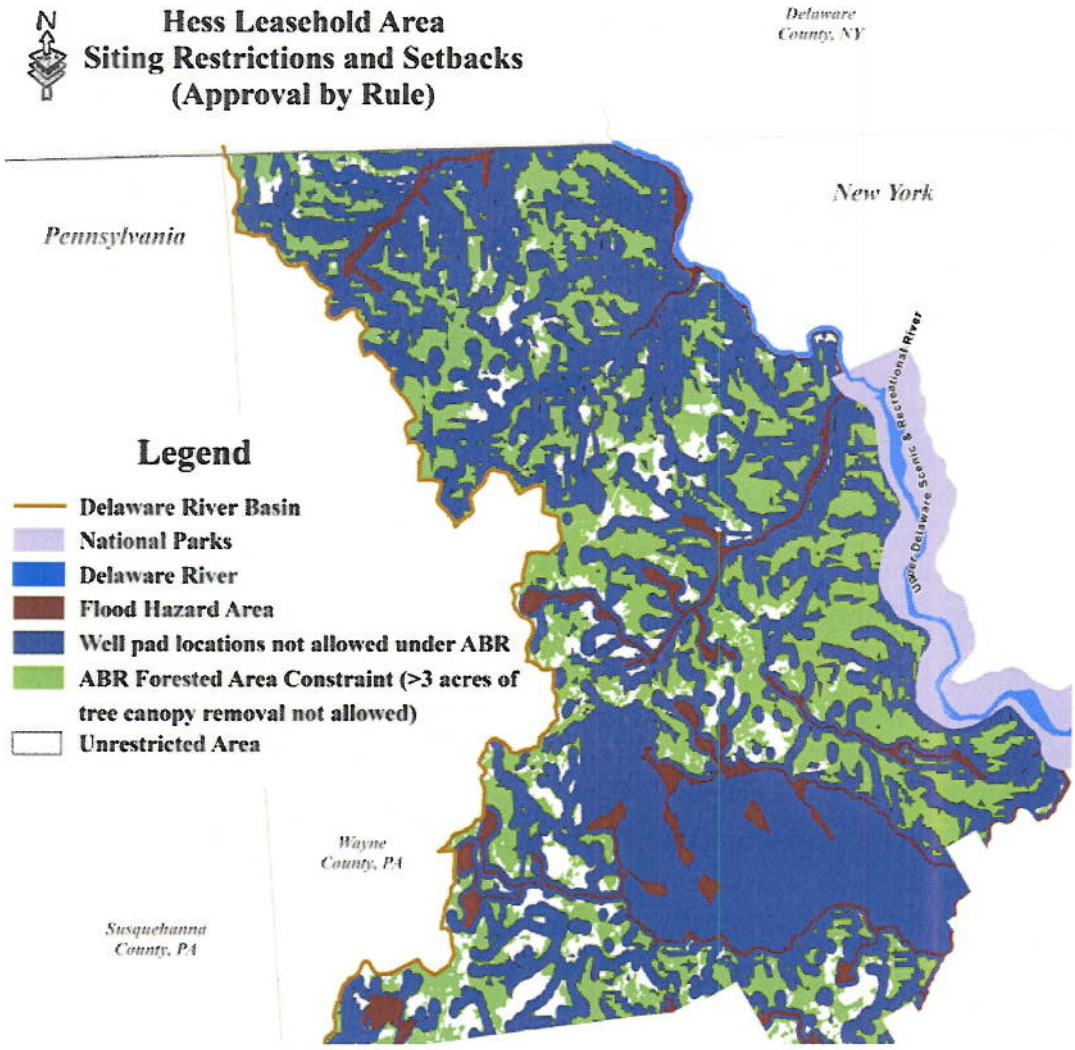


Figure 3: Comparison of Setbacks and E&S Permit Requirements

Agency	Well Setbacks (ft)		E&S Permit
	Water Body	Wetland	
DRBC	500	500	Required
SRBC	None	None	Not Required
PADEP	100	100	Required
NYSDEC	150	150	Required
TXRRC	None	None	Not Required
NDIC	None	None	Not Required

4.2. Natural Gas Development Plan

Under the proposed regulations obtaining approval for Natural Gas Development Plans (NGDP) is anticipated to take 18 to 24 months. Hess currently has leases within the Basin which will begin expiring in 2013. Hess recommends DRBC provide a mechanism in the NGDP framework that recognizes the interests of all stakeholders and allows for natural gas development to proceed in a timelier manner.

Hess already employs a number of similar planning elements contained in the DRBC's proposed NGDP framework that aim to avoid or minimize environmental impact. The NGDP process could be strengthened further by emphasizing use of risk based BMPs and other mechanisms, such as well site selection screening criteria, as a means of continuously improving well pad environmental footprint.

Hess uses BMPs to control sedimentation and runoff associated with well-site construction and related facilities, as indicated by the following examples from two vertical exploration wells Hess recently drilled in the Basin:

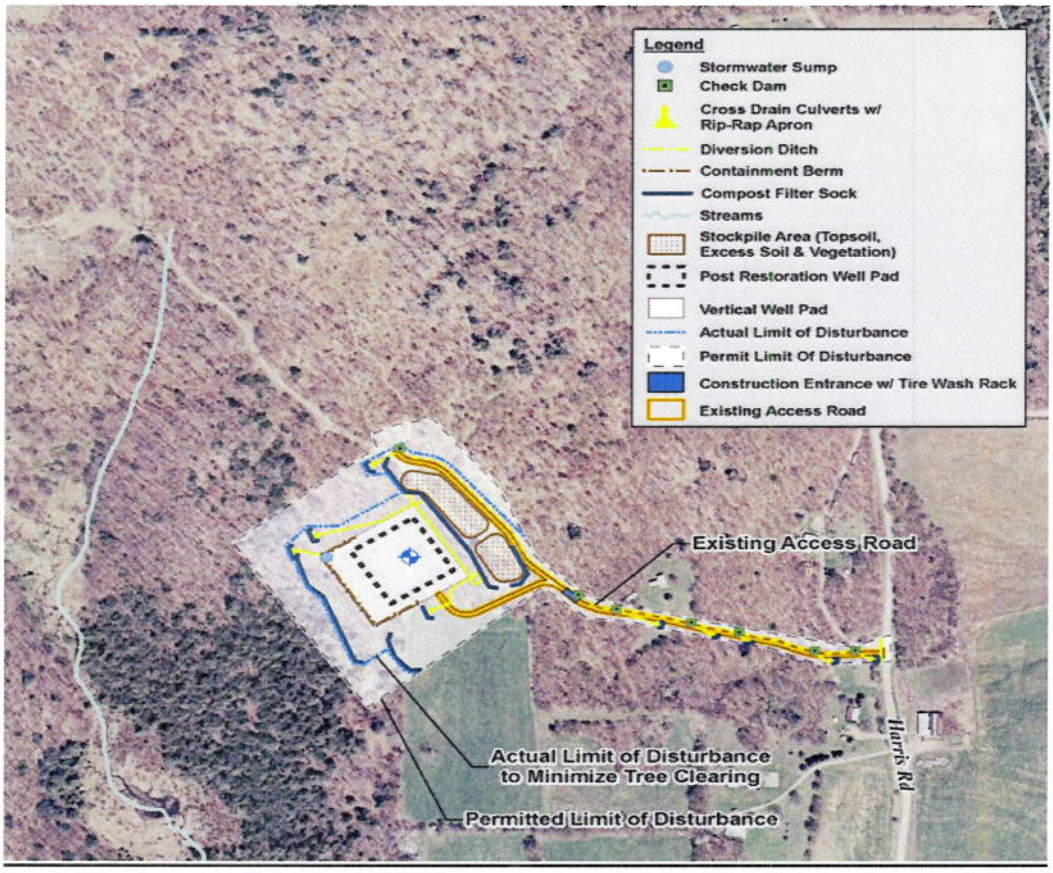
- Construction vehicle wheels are washed on a stabilized rock entranceway prior to exiting the well site to avoid tracking excessive mud onto the highway and reducing potential for runoff to stream.
- Compost filter socks are utilized to prevent site runoff and to minimize sediment loading
- Construction areas are stabilized within 7 days of earthwork to prevent erosion and sedimentation potential from rain events.
- Erosion control matting is installed on slopes with higher potential for erosion (3:1 or steeper).
- Access road width is limited to 14 ft to minimize earth disturbance.
- Existing access roads are utilized wherever possible to minimize earth disturbance.
- Clearing wooded areas is avoided where feasible.
- Soil stockpile height is limited to 10 ft and stabilized with 24" compost filter sock downslope (reduces risk of soil stockpile erosion).

BMPs are further identified in **Figures 4 and 5** below. Well pad footprints for the two wells drilled in the Basin were reduced from the initial disturbed areas of 7.8 and 11.2 acres to 1.25 and 1.51 acres, respectively. After each well is drilled and completed well pads and associated facilities are restored as required by state regulations or by internal expectations. More detailed information on the well sites' features is provided below:

4.2.1 DRBC – 1V E&S Features

- Limit of Disturbance (LOD) during construction: 11.2 acres.
- Wooded Area within LOD: 8.6 acres; reduced by 1.5 acres to mitigate forest clearance.
- Restored Site (200' x 200' gravel pad,14' gravel access rd)
- Successfully used approx. 1,530 ft of existing access road to avoid new land disturbance.
- Dist. to nearest stream: approx. 500 ft
- Topsoil stockpiles located upslope of gravel pad to divert off-site drainage from disturbed area.
- Access road slope limited to 8% to reduce erosion potential.

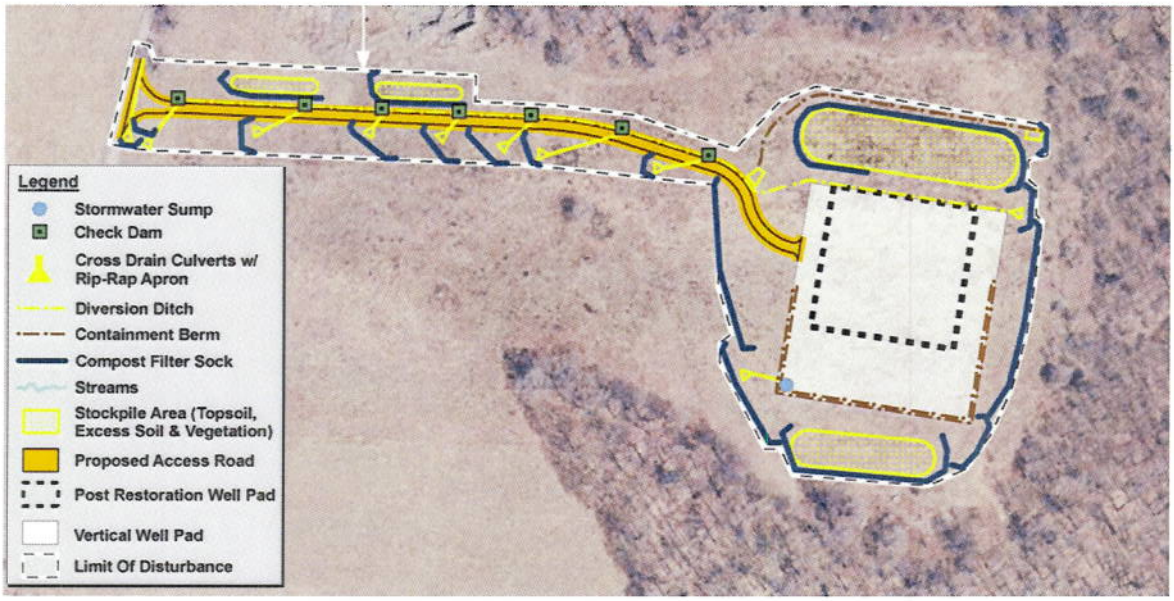
Figure 4: DRBC-1V Erosion and Sediment Control BMPs



4.2.2 DRBC - 2V E&S Features

- Limit of Disturbance (LOD) during construction: 7.8 acres.
- Wooded Area within LOD: 0.0 acres.
- Restored Site (200' x 200' gravel pad and 14' gravel access road): 1.25 acres.
- Access road slope limited to 8% to reduce erosion potential.

Figure 5: DRBC-2V Erosion and Sediment Control BMPs



4.3. Variance Mechanism

Although the DRBC's proposed variance process has not yet been defined it can be assumed that risk based BMP's with similar objectives would serve as the basis for which DRBC grants a variance, thereby rendering the variance requirement unnecessary. Hess recommends the proposed Article 7 regulations be revised to include the use of case-by-case risk-based protections rather than uniform measures that restrict development across the Basin.

4.4 Water Sourcing / Reuse / Recycling

Hess strongly supports and respects the DRBC's efforts to manage and conserve water resources. Our objectives are to manage water sourcing and use so that resources are conserved and impacts to other area water users are minimized.

Potential water sources are evaluated with the objective of minimizing potential environmental impact and footprint (**Figure 6**). The screening process is part of a wider pre-site assessment and includes elements as outlined below:

- Minimizing the distance and routing from a water source to a well pad is the top priority and serves to minimize truck traffic on area roads. Where trucking of water is required, the route and timing of road use are carefully considered and planned to have the least impact on the community and other area road users.
- Piping water to the well site rather than trucking is the top screening criterion.
- The use of centralized impoundments is considered where feasible to minimize truck traffic as well as to enable storing water that can then be used during dry periods or drought thus avoiding the potential for impacts to other water source users.
- Groundwater source selection aims to avoid potential impacts to other area groundwater users. Area groundwater users are surveyed before selecting a proposed location where our groundwater use will avoid or have minimal impact on other users' wells.
- Feasibility of using alternate sources of water are considered, such as mine drainage, to minimize use of fresh water.
- Hess continually evaluates new or innovative treatment options to allow for the maximum volumes of water produced during flowback operations to be recycled and reused.

As such, Hess is broadly aligned with the DRBC in efforts to protect and conserve Basin water resources but opportunities remain to improve our ability to better manage our water use in accordance with the proposed Section 7 regulations; these are as follows:

Section 7.4(c)(3) limits the Approval by Rule use of recovered flowback and production water and new water sources if the sources are located within the physical boundaries of an approved NGDP. Since an operator may have multiple NGDPs allowing an approved water source to be used in multiple NGDPs would enable greater flexibility and avoid having to obtain additional approved water sources within the boundary of each NGDP.

Section 7.5(h)(2)(ii)(G) requires the reuse or disposal of water recovered during flowback within 45 days of well stimulation unless an extension is approved. This provision seems overly restrictive by requiring an approval to store water for longer than 45 days that could be re-used beneficially for additional stimulations. A longer period of 90 days would not result in additional risk of mismanagement and enable greater flexibility in optimizing full life cycle water management planning.

Section 7.5(h)(2)(ii)(G) states that the project sponsor may not transfer recovered flowback to any other well pad site, or transfer it to a centralized wastewater storage facility, unless approved in a docket, ABR, or in writing by the Executive Director. This provision is overly restrictive and could have the unintended consequence of reducing volumes of recycled flowback if the only alternative is a complex and lengthy approval process. The time required to obtain additional approvals may limit a sponsor's ability to make optimal use of water recovered during flowback operations. Utilization of a notice to the DRBC of intent to transfer, rather than an approval, would be preferable.

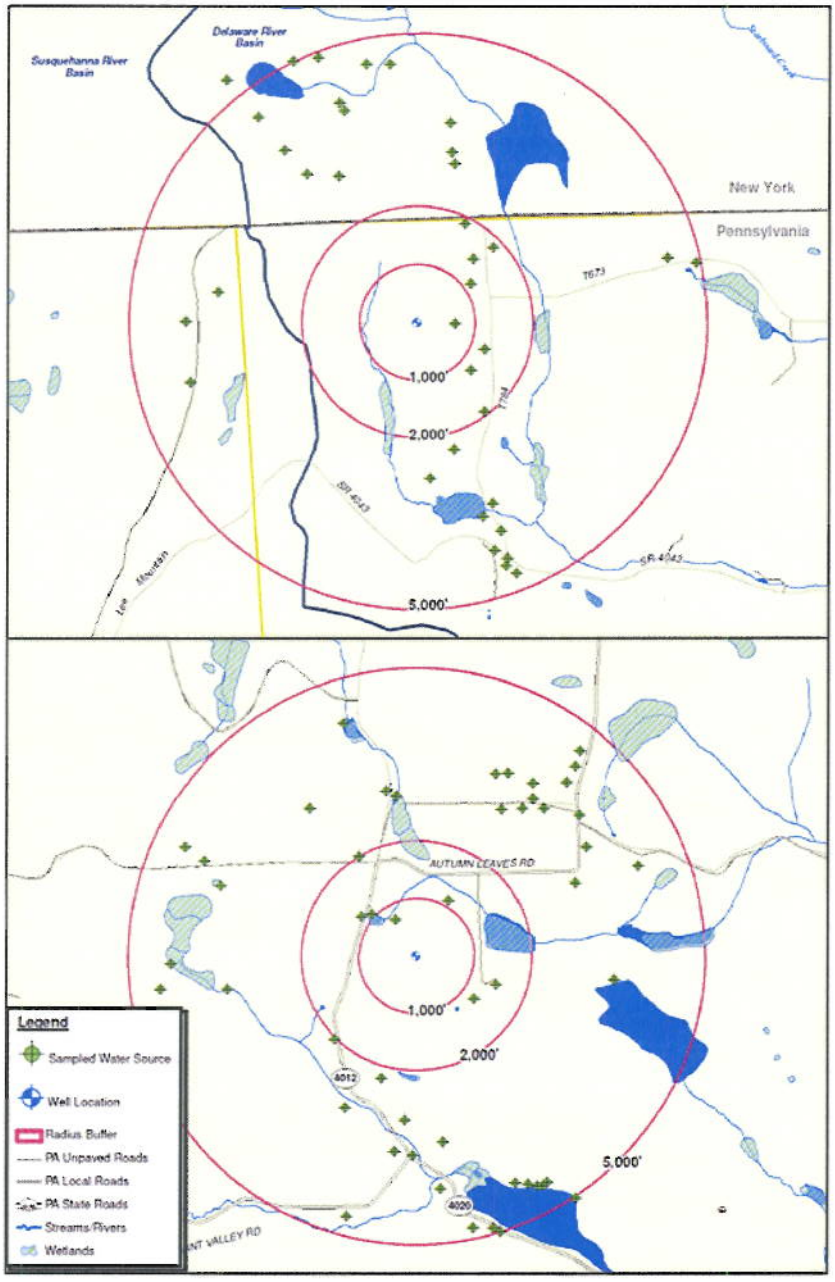
Figure 6: Water Source Screening Criteria

WATER SOURCE SCREENING CRITERIA (GROUND WATER)		
PROXIMITY TO WELL PAD		SCORE
1	Well Pad	100 (best)
2	0 – 0.5 miles	60
3	0.5 – 1.5 miles	40
4	> 1.5 miles	0 (worst)
AREA OF HYDROLOGIC CONTRIBUTION		SCORE
1	> 30 mile^2	100 (best)
2	15 – 30 mile^2	60
3	5 – 15 mile^2	40
4	< 5 mile^2	0 (worst)
NEW ACCESS ROAD (WATER WELL SITE ACCESS)		SCORE
1	< 250'	100 (best)
2	250' - 750'	60
3	> 750'	0 (worst)
WETLANDS, FLOODPLAINS CONSTRAINT		SCORE
1	None	100 (best)
2	Present	0 (worst)
STREAM CROSSING, ROAD CROSSING		SCORE
1	None	100 (best)
2	Present	0 (worst)
TRUCK TRAFFIC IMPACT TO COMMUNITY		SCORE
1	Ability to pipe – no trucking	100 (best)
2	No interaction	60
3	Avoidable	40
4	Unavoidable	0 (worst)

4.5 Monitoring / Water Sampling / Groundwater Protection

Concerns have been raised about protection of drinking water supplies, aquatic habitat, freshwater, chemical use, wastewater management and truck traffic, among others and we recognize and fully support the DRBC's efforts to establish comprehensive baseline groundwater quality data and to protect groundwater quality. This support is reflected in our pre-drill site assessment, which included sampling drinking water sources out to a radius of 5,000 ft from proposed natural gas wells **(Figure 7)**. Our sampling program was designed through a risk based assessment that also led to a set of more than 70 sampling parameters.

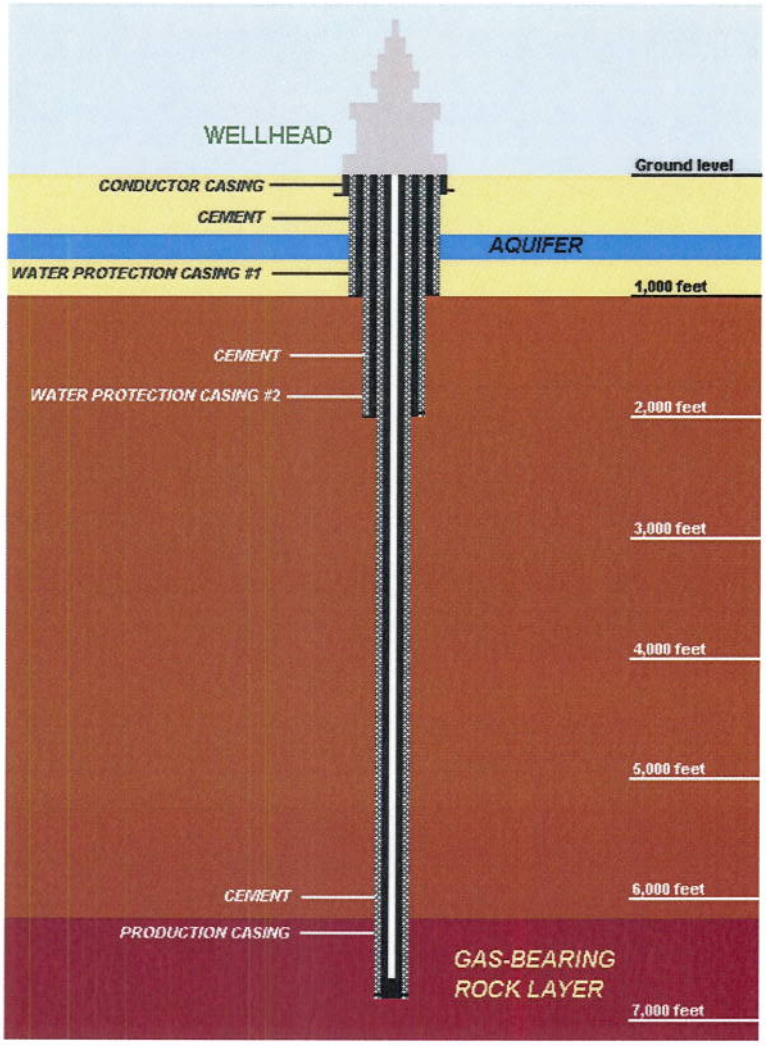
Figure 7: Hess Groundwater Sampling Protocol, DRBC – 1V, DRBC – 2V



Hess' sampling program exceeded both the PA limit of presumed liability (1,000 ft sample radius) and that of the proposed Article 7 regulations (2,000 ft sample radius). In this case adherence to a 2,000ft limit would have excluded 65 incremental water source samples. The rigid nature of the proposed regulations could lead in the future to similar scenarios where incremental water source samples are not collected or additional water quality sampling parameters are not analyzed.

The proposed regulations further require the drilling of new groundwater wells for monitoring purposes if no groundwater sources can be identified within 2,000 ft of the well. We believe such drilling to be prescriptive without clear risk based drivers and therefore unnecessary, as noted in our recommendations summary below. Water sampling programs should be based on an evaluation of an individual site's risk. Further, the requirement does not recognize a variety of additional risk-based mitigation measures such as protective layers of water casing strings. These mitigations are either required by host state regulatory agencies or installed as a matter of internal policy to protect area groundwater resources. As such, a further DRBC regulatory requirement to drill new monitoring wells is unlikely to provide incremental benefit, and may instead incur greater environmental risk as a result of the water well drilling activity.

Figure 8, Groundwater Protection – Well Construction



Additional groundwater protection measures are utilized in the well construction process .Our exploration wells in the Basin are constructed with multiple layers of steel pipe encased in cement to isolate shallow fresh water aquifers from deeper brackish water zones and from wellbore production thousands of feet below the water table.

An initial string of casing called "conductor pipe" is installed, followed by two water protection casing strings cemented in place below the fresh water aquifer, followed by "production casing" cemented in place to isolate the producing zones in the well. **(Figure 8)** The use of two water protection casing strings adds an additional level of protection to area groundwater resources.

4.6 Landowner Involvement

Hess continuously strives to be a good neighbor and trusted partner. We appreciate the opportunity to consult with landowners as to how our proposed activities can be tailored to better meet their current and future needs.

Each landowner has an interest in ensuring the water resources on his or her property are protected. Hess drafted its lease form specifically to give landowners additional rights in choosing locations of well sites, access roads and support facilities. This collaborative approach has maximized land utilization potential. Hess will continue to build trusted partnerships by offering landowners an ability to engage in how their land is developed.

The proposed Article 7 regulations do not provide a mechanism to address landowner concerns. As noted below, Hess suggests an approach whereby landowners retain some discretion as to where wells are drilled on their land.

4.7 Reporting

Hess is committed to the highest levels of transparency and to meeting or exceeding all applicable regulatory standards. We support public disclosure of chemicals used in hydraulic fracturing that balances public and proprietary interests and we continue to work with our suppliers, industry participants, state authorities and appropriate stakeholders to keep the public informed.

5. Recommendations

The intent of the following recommendations is to assist the DRBC proposed regulations better serve the needs of all stakeholders in natural gas development while preserving and protecting the water resources of the Basin.

5.1. Siting Restrictions and Constraints

Hess recommends DRBC rely on existing host state regulations for siting criteria and for the use of proven risk-based Best Management Practices (BMPs). Doing so would provide the same or better protections than the narrow requirements in proposed draft regulations.

5.2. Natural Gas Development Plan

Hess recommends the NGDP process include measures to improve operational flexibility and reduce the level of administrative burden implied by a five year planning time horizon. For example:

- A given NGDP will undergo a series of revisions throughout the project cycle due to improved understanding of the reservoir, changes in leasehold positions, changes in the economic environment and mid-stream contract arrangements. The NGDP process should allow operators to adjust the plan within a defined set of tolerances without having to obtain supplemental DRBC approval. For significant changes to the NGDP a notice form could be submitted to the DRBC that details the proposed changes with a specified timeframe for responding to the proposed change.
- Operators should be able to begin to develop a more narrowly defined lease area while planning development of other lease areas. This would enable operators to satisfy variable time sensitive lease obligations. For example, Hess has leases within the Basin that will expire starting in 2013 while others extend out to 2020.

- The NGDP process should allow for the use of Best Management Practices (BMPs) and proven mitigation measures in lieu of prescriptive setbacks and constraints that may limit opportunities to utilize site-specific mitigations. Host state setback and siting restrictions, and requirements to use BMPs and other mitigation measures that provide a level of protection that equals, or exceeds, that afforded by the proposed setbacks and restrictions in the draft regulations.

5.3. Water Sourcing / Reuse / Recycling

As stated, Hess supports the DRBC's efforts to protect and conserve water resources within the Basin. The following recommendations are intended to improve water use efficiency:

- Section 7.4(c)(3) limits the Approval by Rule (ABR) process to recovered flowback, produced water and new water sources used within the physical boundaries of a specific approved NGDP. This limitation should be removed to enable using a given approved water source across multiple approved NGDPs without requiring duplicate approvals. Doing so would provide greater ability to optimize full life cycle water management objectives and reduce or eliminate wasted Commission efforts.
- Section 7.5(h)(2)(ii)(G) requires the reuse or off-site disposal of water recovered during flowback within 45 days of when the well is stimulated unless an extension is approved. This requirement should be modified to afford the maximum use of water recovered during flowback operations. The flowback water storage timeframe could be extended without detriment to the DRBC's goals and thereby decrease the administrative burden.
- Section 7.5(h)(2)(ii)(G) should be amended to remove the restriction on the transfer of water recovered during flowback operations without an approved docket, ABR, or an exemption from the Executive Director. This restriction may limit opportunities to re-use water recovered during flowback operations.

5.4. Monitoring / Water Sampling

Hess strongly supports the DRBC's efforts to acquire water quality baseline data for area groundwater resources and believes doing so will further demonstrate shale gas resources can be developed in a responsible and environmentally sound manner. However, the requirement to install monitoring wells if none can be identified within 2,000ft of the well is not the optimal solution. As noted previously, it is recommended that this requirement be removed provided an operator can demonstrate BMPs or mitigations are in place to sufficiently monitor and protect Basin water resources. For example, the installation of two water casing protection strings to isolate fresh water systems in gas wells or a comprehensive sampling program of existing groundwater sources.

Hess also recommends that the provision for annual water well sampling until a well is ultimately plugged and abandoned be replaced with a term that expires one year following the last hydraulic fracturing event.

5.5. Landowner Involvement

Hess recommends the proposed Article 7 regulations be revised to include greater landowner participation in the siting of wells and associated infrastructure on their property while still honoring the terms of the lease agreements.

5.6. Regulatory Definitions, Clarifications

Hess recommends clarifying or defining a number of terms to ensure consistent outcomes and broad alignment. *For example:*

> **Section 7.2:** The definition of a wellbore should be changed to "any hole drilled for the purpose of exploration or for production of natural gas or other liquid hydrocarbons or injection of water." It is often used interchangeably with well or borehole. A wellbore may have casing in it or it may be open (uncased); or partially cased.
>
> **Section 7.3(n)(1)(i):** It is recommended the wording "or poses a threat to the water resources of the basin" be either clarified or removed.

Section 7.4(b)(2): It should be clarified that the referenced 3-5 million gallons is an estimate based on current technology and practices, which could change in the future.

Section 7.5(h)(1)(vi): It is recommended that the term "threatened release" be defined.

Section 7.5(h)(1)(vi)(C): Provision of written notification to all potentially impacted users of surface water may not be practicable. It is recommended that DRBC include a definition or description of the process used to determine who might be a "potentially impacted user", or specify procedures that would discharge this duty.

Section 7.5 (h)(2)(ii)(F): It is recommended that a "representative" sample of produced (flowback) water be clarified. A representative sample may not be possible given the changing profile during the flowback period.

6. Summary

We believe well planned and executed gas development activities are safe for the environment and the public and a necessary part of producing reserves that help foster energy security.

We are committed to a collaborative and transparent working relationship with the DRBC. One of our core values is to be the most trusted energy partner. To that end, we strive to excel in the areas of environment, health and safety. We use sound, risk based mitigation measures that include site restoration of all wells and other measures essential to minimize erosion and sedimentation. We always aim to protect nearby water bodies and streams and to match or exceed the level of protection required by applicable regulations.

Sincerely,

J.B. Fowler
Director, Project Operations

cc. J. Daniel Arthur, ALL Consulting
Craig Wilson, K&L Gates