

MARYLAND CENTER FOR ENVIRONMENTAL TRAINING
19th Annual Maryland Ground Water Symposium
Baltimore, Md

YOUR WELL FIELD Do You Really Know What You Have?

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September 29, 2010



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Making improvements to an existing well on the Piedmont

Existing Well Fields

- Existing Well Systems often absorbed without historical documentation of the sources
- Sustainable Yield of Existing groundwater sources is often unknown or over exaggerated
- Pumping Equipment is often inefficient for the system
- Existing sources should be properly assessed for long-term sustainable yield and water quality
- Existing Wells can often be rehabilitated to enhance yield and/or improve water quality
- Construction Specifics of wells are essential tools in diagnosing problems with well yield and/or water quality



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HSA Approach to Well Field Assessment

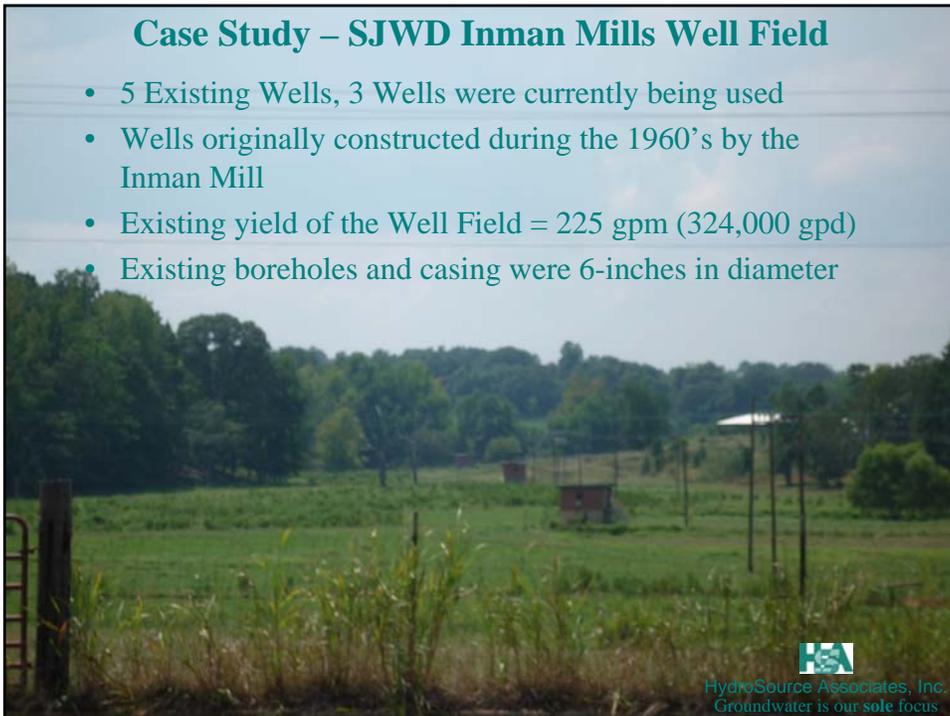
- Thoroughly investigate the condition of the well field
- Downhole Camera Inspection
- Review of Existing Pumping Records
- Review of Water Quality history of well sources
- Conduct Brief Pumping Tests, if existing data does not exist or is of poor quality
- Recommendations as to how to improve well yield and/or efficiency
- HSA offers a full suite of well rehabilitation services for a variety of situations



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Case Study – SJWD Inman Mills Well Field

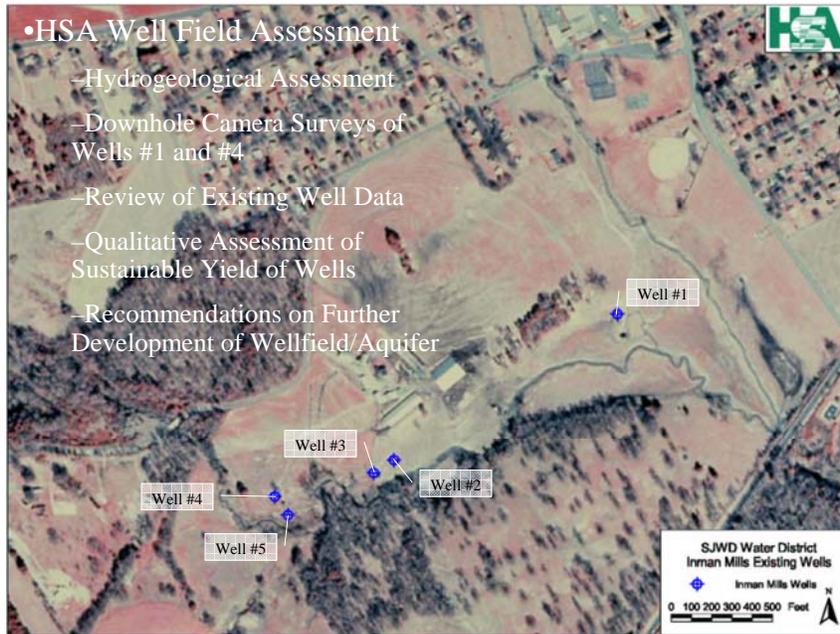
- 5 Existing Wells, 3 Wells were currently being used
- Wells originally constructed during the 1960's by the Inman Mill
- Existing yield of the Well Field = 225 gpm (324,000 gpd)
- Existing boreholes and casing were 6-inches in diameter



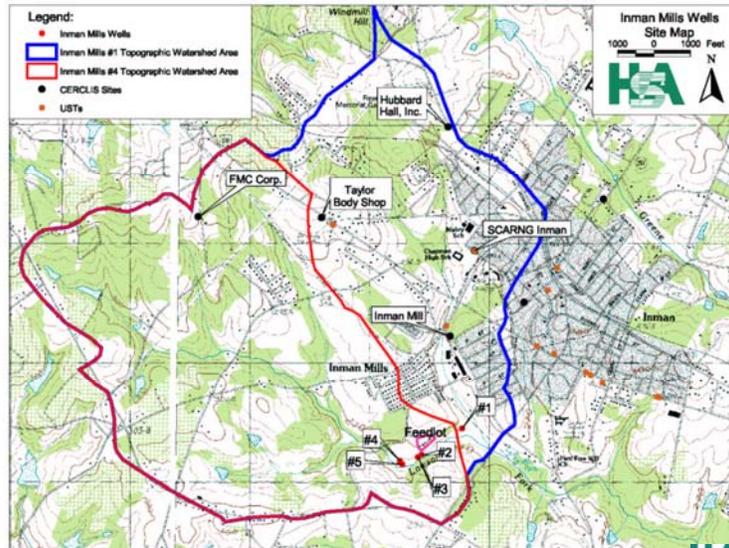
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•HSA Well Field Assessment

- Hydrogeological Assessment
- Downhole Camera Surveys of Wells #1 and #4
- Review of Existing Well Data
- Qualitative Assessment of Sustainable Yield of Wells
- Recommendations on Further Development of Wellfield/Aquifer



Inman Mills – Hydrogeological Assessment



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Your Well Field - Do You Really Know
What You Have?

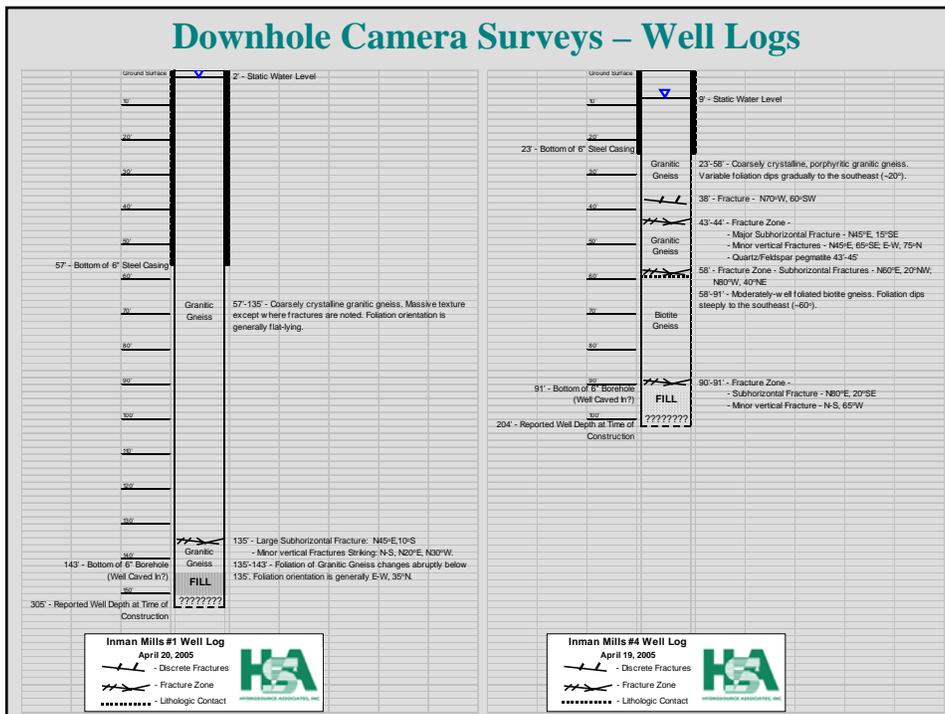
Downhole Camera Surveys – Inman Mills Wells #1 and #4

- Documentation of construction specifics, assesses the physical condition of the wells, and provides qualitative estimates of potential well yields.
- The video investigations into Wells #1 and #4 revealed that both wells were filled in with sediment to the base of the pump.
- Camera investigations also revealed that the existing steel well casing used in these wells had deteriorated over the years.
- Several bedrock structures of a variety of orientations were found to intersect both wells. The majority of the structures observed in Inman Mills Wells #1 and #4 have a nearly horizontal orientation.



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Downhole Camera Surveys – Well Logs



Your Well Field - Do You Really Know
What You Have?

Existing Well Data Review

- HSA reviewed existing pumping test data from Inman Mills Wells #1, #4, and #5 from 1987
 - Pumping test data indicates that the well yield was originally overestimated
 - Data also indicates a relatively high production capacity for the well field
 - Wells were tested individually without regard for pumping interference
- HSA made FOI requests to state agencies for historical water quality information on the Inman Mills Wellfield
 - There was no indication of historical or potential water quality issues relating to increased production for the well field.



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Recommendations for Well Field Development

- The overall density of fracturing within the wells indicated that additional fractures would likely be intersected should the wells be cleared of debris and/or deepened past their current depths.
- Through discussions between HSA the water district, the district chose to construct new wells within the Inman Mills well field rather than rehabilitate the existing wells.
- The construction of new wells allowed for the replacement of deteriorating well casing and also allowed for larger casing diameter required to realize the full yield potential of the aquifer.

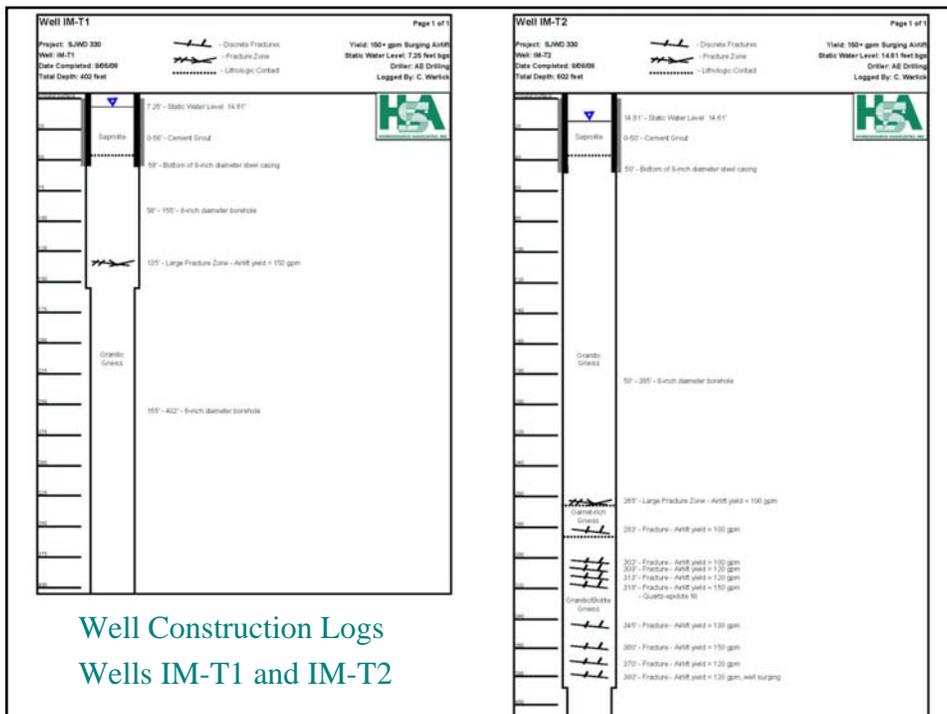


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New Well Construction

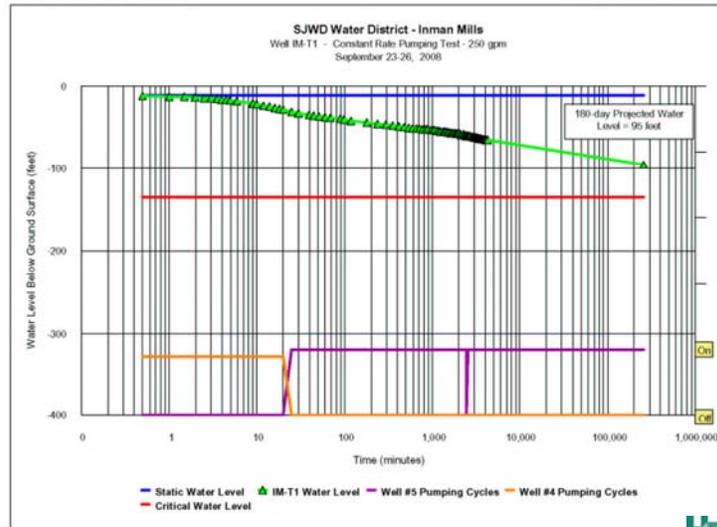
- HSA obtains 5 well construction applications in one application
- The water district opted to construct two new wells at sites IM-T1 and IM-T2
 - these two locations had the potential for the greatest yield increases
 - that these two sites were subject to the least pumping interference amongst the wells
 - more “new” water would be produced as a result


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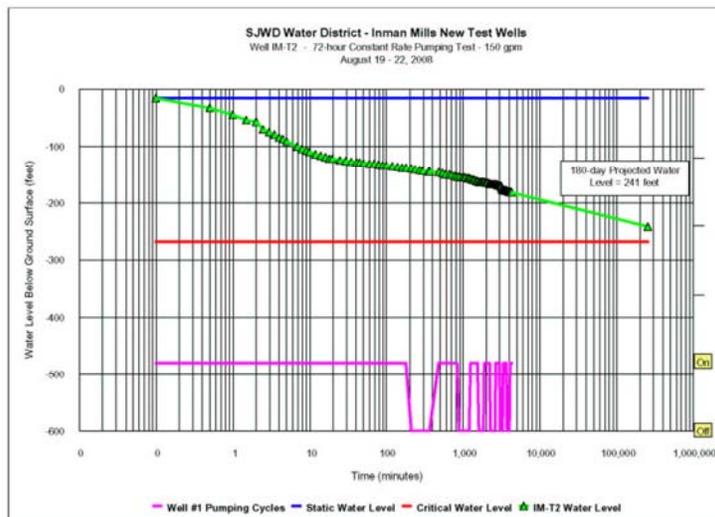
Your Well Field - Do You Really Know
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Well IM-T1 – 72-Hour Constant Rate Pumping Test



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Well IM-T2 – 72-Hour Constant Rate Pumping Test



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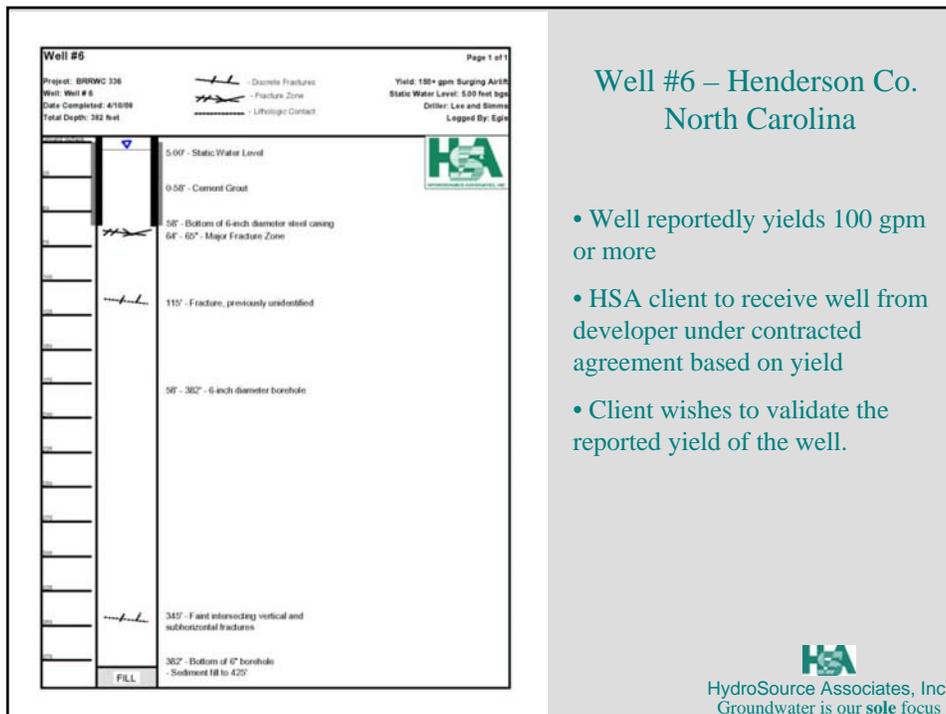
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Results

- Well IM-T1 has a long term sustainable yield of 250 gpm (360,000 gpd)
- Well IM-T2 has a long term sustainable yield of 150 gpm (216,000 gpd)
- This represents a total sustainable yield of approximately 576,000 gpd from only two wells
- Pumping interference between the two wells is negligible
- All water quality parameters were found to be within state and EPA standards with similar water chemistry to the existing wells.



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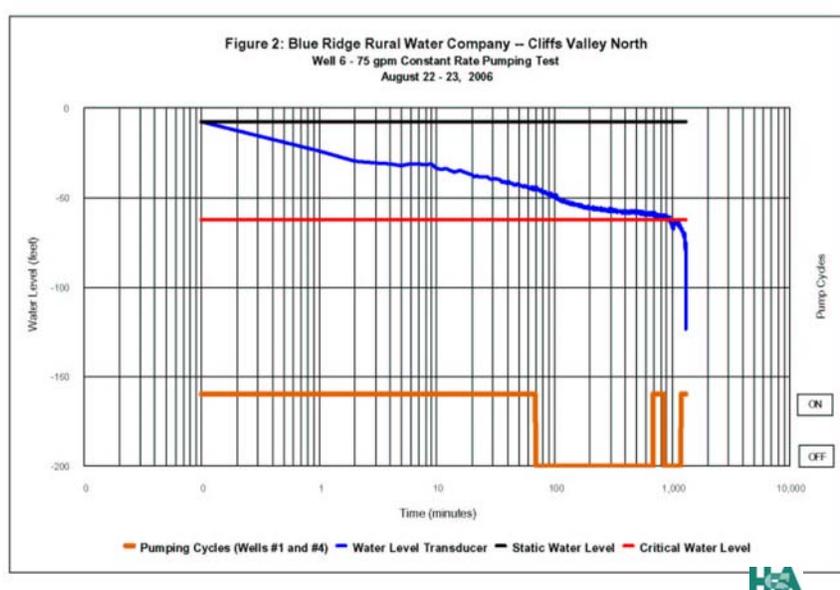
Well #6 – Henderson Co. North Carolina

- Well reportedly yields 100 gpm or more
- HSA client to receive well from developer under contracted agreement based on yield
- Client wishes to validate the reported yield of the well.



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Well #6 – Constant Rate Pumping Test



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Summary/Questions?

- Proper well field evaluations are necessary to determine the long term sustainability of groundwater resources.
- Evaluations can identify additional groundwater supply that is available and obtained in a cost-effective manner.
- Evaluations can also avoid wasted investment of system funds to further develop groundwater sources.

• QUESTIONS?



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HSA Well Rehabilitation Techniques



Hydrofracturing a well.



Preparing to lower the Airburst acoustic wave generator gun.



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