Zacks Small-Cap Research

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Spring Bank Pharmaceuticals Inc. (SBPH - NASDAQ)

1Q:17 Report; First Cohort Dosed in ACHIEVE

Based on our DCF model and a 20% discount rate, SBPH is valued at approximately $33.00 per share. Our model applies a 15% probability of SB9200 sales for chronic hepatitis B virus based on historical Phase 2 success ratios. Our valuation includes geographic contributions from the US, Europe and Asia.

Current Price (4/28/2017)	$9.58
Valuation	**$33.00**

OUTLOOK

Spring Bank Pharma is currently conducting a Phase 2 trial for SB 9200, an immunomodulatory agent built on their small molecule nucleic acid hybrid chemistry platform. The drug targets the RIG-I and NOD2 signaling proteins, engaging the body's immune response to potentially address a variety of diseases including HBV, RSV, HIV Latency and HDV.

In June 2016, the company began dosing its first patient in its ACHIEVE trial with initial data expected in 2Q:17. Following $33 million in FY:16 fundraising, SBPH has sufficient capital to complete its Phase 2a and STING preclinical development through 2H:18.

At the current price, we view Spring Bank shares as undervalued, with substantial upside given the size of the Hepatitis B market. We maintain our target price of $33.00 per share and believe that expansion into new diseases and the STING program can provide additional upside to our valuation.

SUMMARY DATA

52-Week High	**13.25**
52-Week Low	**6.31**
One-Year Return (%)	**N/A**
Beta	**N/A**
Average Daily Volume (sh)	**19,009**
Shares Outstanding (mil)	**9.42**
Market Capitalization ($mil)	**90.3**
Short Interest Ratio (days)	**1.66**
Institutional Ownership (%)	**N/A**
Insider Ownership (%)	**N/A**
Annual Cash Dividend	**$0.00**
Dividend Yield (%)	**0.00**
5-Yr. Historical Growth Rates	
Sales (%)	**N/A**
Earnings Per Share (%)	**N/A**
Dividend (%)	**N/A**
P/E using TTM EPS	**N/A**
P/E using 2017 Estimate	**N/A**
P/E using 2018 Estimate	**N/A**
Zacks Rank	**N/A**

Risk Level	**Above Average**
Type of Stock	**Small-Growth**
Industry	**Med-Biomed/Gene**

ZACKS ESTIMATES

Revenue

(In millions of US$)

	Q1 (Mar)	Q2 (Jun)	Q3 (Sep)	Q4 (Dec)	Year (Dec)
2016	$0.3 A	$0.1 A	$0.0 A	$0.0 A	$0.4 A
2017	$0.0 A	$0.0 E	$0.0 E	$0.0 E	$0.0 E
2018					$0.0 E
2019					$0.0 E

Earnings per Share

	Q1 (Mar)	Q2 (Jun)	Q3 (Sep)	Q4 (Dec)	Year (Dec)
2016	-$1.11 A	-$0.62 A	-$0.53 A	-$0.13 A	-$2.39 A
2017	-$0.69 A	-$0.48 E	-$0.43 E	-$0.37 E	-$1.75 E
2018					-$1.72 E
2019					-$2.01 E

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WHAT'S NEW

Spring Bank Announces 1Q:17 Results

Spring Bank Pharmaceuticals Inc. (NASDAQ: SBPH) filed its first quarter 2017 form 10-Q on April 28, 2017 in conjunction with a press release highlighting the progress on its Phase 2a trial. First quarter 2017 revenues were zero and compare to $280 thousand received in the prior year period. Operational expenses were ($4.6) million compared to our estimates of ($4.5) million due to higher G&A. Net loss of ($0.69) per share was below our estimates of ($0.49) per share.

Operating expenses in 1Q:17 were $4.5 million, divided between R&D at $2.5 million and G&A at $2.0 million. This was a decrease from the last year's expenses of $6.5 million predominantly due to an amended and restated license agreement with BioHEP that represented $2.7 million in non-cash charges. Lower expenses on pre-clinical studies were also a factor in the year over year difference, but were partially offset by additional salaries and benefits.

General and administrative expenses were $2.0 million in 1Q:17 rising from $1.2 million in 1Q:16 over the same period in the prior year. The increase was attributable to a rise in stock-based compensation, additional salaries and benefits and greater public company expenses which were offset by lower consulting related costs.

Interest income was $41 thousand, up from $17 thousand in the prior year, and other loss was ($2.0) million, due to the increase in fair value of warrant liabilities in the November placement. Our forecasts did not include any amount for warrant liability valuation changes which comprise most of the difference between our net loss estimates and actuals.

Net loss in the quarter was at ($6.5) million, below our estimate of ($4.6) million due almost entirely to the change in value of warrant liabilities. Average shares outstanding increased to 9.4 million from the November share issuance resulting in the first quarter's loss per share of ($0.69). Cash burn was ($4.2) million, flat with the level in the prior quarter, but down from ($4.7) million in 1Q:16.

End of quarter cash and equivalents of $21.1 million fell sequentially from $25.5 million, providing sufficient capital to support the company's development programs until third quarter 2018.

Spring Bank has completed the enrollment of the first cohort in its Phase 2a dose finding study and expects to report top-line results for this cohort before the end of 2Q:17. We remind investors that expectations for the initial dose of 25 mg are minimal given the objective of developing a dose response curve. The second, third and fourth cohorts will double the dose of SB9200 each iteration to 50 mg, 100 mg and 200 mg respectively and are where we should expect to see an optimal response rate.

Anticipated Milestones

- 2Q:17 - Report top-line results from first dosing cohort from SB 9200 Phase 2a ACHIEVE study
- 2H:17 - Preclinical proof-of principle results for SB 11285 in certain cancer in vivo models
- Late 2H:17 - Report top-line results from 50mg & 100mg monotherapy cohorts from Phase 2a ACHIEVE study in 2H 2017 & 1H 2018 respectively
- Mid-2018 - Report results from last monotherapy dosing cohort from Phase 2a ACHIEVE study
- Mid-2018 - Potential IND submission for SB 11285
- 2H:18 - Potential preclinical proof-of-principle results for SB 9200 / HBV antivirals fixed-dosed combination
- 2H:18: initiate Phase 2b portion of ACHIEVE study (subject to 2a results & additional funding)

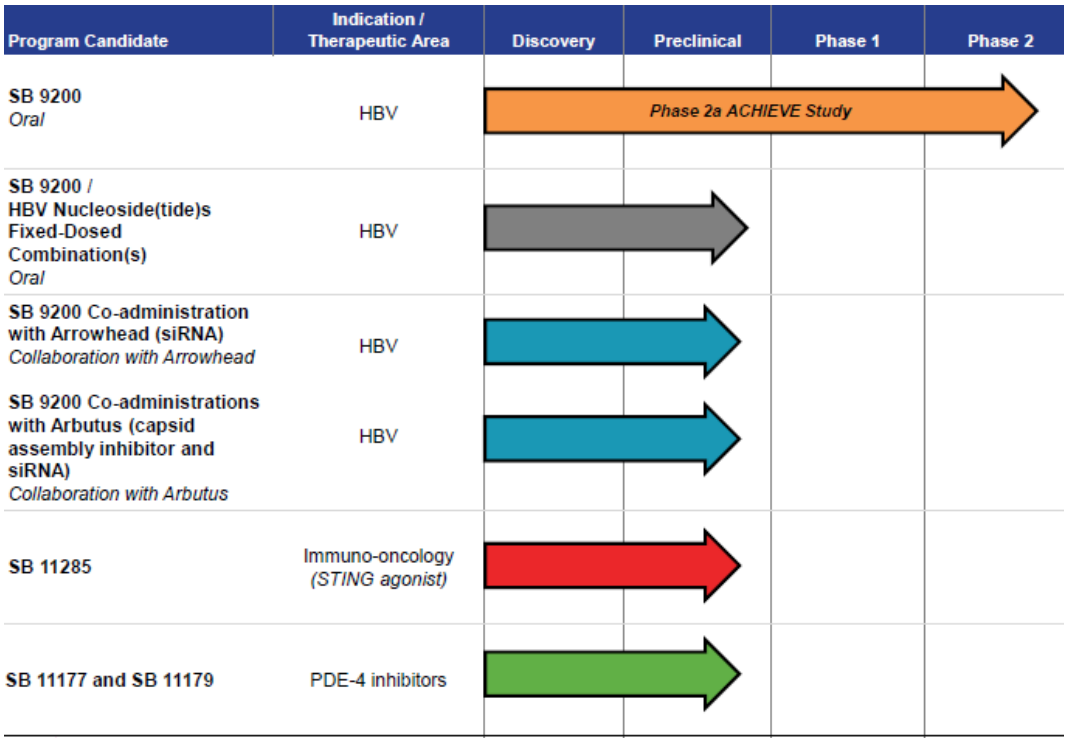
Review of Spring Bank Thesis

As a reminder, we currently have a $33.00 price target based on our estimates of a 2022 worldwide launch of SB 9200 either alone or with a global pharmaceutical partner. SB 9200 is a small dinucleotide developed as a prodrug using the company's small molecule nucleic acid hybrid (SMNH) platform technology. The product is designed to activate specific intracellular sensor proteins including RIG-I, NOD 2 and STING which activate the body's immune system to fight viral infections including hepatitis B (HBV).

The company's lead product is in Phase 2a trials for chronic HBV. SB 9200 is pan-viral and could be a future treatment option in addressing certain viral respiratory diseases, HIV latency, hepatitis D (HDV) and potentially other diseases caused by RNA viruses. The compound functions by selectively modulating the antiviral signaling proteins, RIG-I and NOD2, in virally-infected cells. This selective immune-modulation has the capability to up-regulate the host immune response and potentially destroy the virally-infected cell. Subject to additional funding, Spring Bank may pursue these indications.

SBPH also has a very exciting immuno-oncology drug in the pre-clinical phase that targets the STING (STimulator of INterferon Genes) protein. Initial work performed by Spring Bank and others pursuing this pathway have engendered a lot of interest and investment given the promising early-stage preclinical data. Spring Bank also has other compounds in its pipeline that are in development as shown in the graphic below.

Exhibit I – Summary of Spring Bank Pharmaceutical Pipeline[1]



SB 9200

Using the SMNH technology, Spring Bank has developed SB 9200, which is designed to bind to RIG-I and NOD2, two cytosolic antiviral signaling proteins. SB 9200 is composed of two chemically modified nucleotides linked together which are taken up by the liver binding to RIG-I and NOD2. The HBV virus can downregulate the natural antiviral functions of RIG-I and NOD2, thereby preventing the body's natural immune defense from activating and killing the virus. When SB 9200 enters the cell, it restores interferon production by interacting with RIG-I and NOD2.

Phase 2a Trial for SB 9200

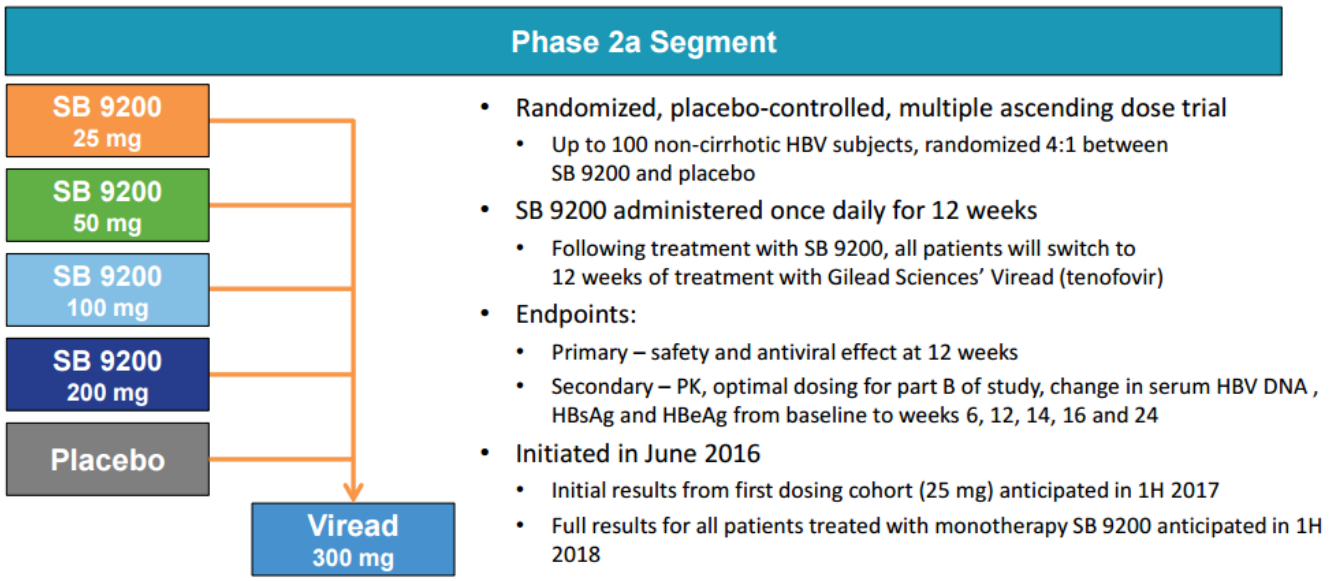
The Phase 2a trial is a proof of principle, dose finding study entitled: "A Study Evaluating the Safety, Pharmaco-kinetics, and Antiviral Efficacy of SB 9200 in Subjects Infected with Chronic HBV (ACHIEVE)." The principle objectives for the trial are to evaluate the safety and antiviral effect of SB 9200 following 12 weeks of monotherapy. Following the initial 12 weeks of treatment, all patients will then be placed on tenofovir 300mg daily for an additional 12 weeks to see if sequential therapy can improve response. The study will establish the optimal dose for SB 9200 for HBV and define the pharmacokinetics of SB 9200 in CHB patients. Patients selected for the trial will have documented evidence of chronic HBV, must not be taking any anti-viral medications, have appropriate levels of

[1] Source: April 2017 Corporate Presentation

HBV DNA and ALT, no evidence of hepatocellular carcinoma, and negative pregnancy test with no plans to conceive during the study.

The primary endpoint will be safety and >1log reduction in HBV DNA. The secondary endpoints will be a reduction in HBeAg and HBsAg. We believe that a a 0.5 log reduction in HBsAg in 30% or greater patients will indicate a successful trial because this exceeds the efficacy of interferon and the side effect profile is substantially better and administration is by tablet rather than an injection. Extensive virology and immunology substudies will be generated from this Phase 2a trial to ascertain additional information on relevant biomarkers, immune responses and other key factors.

Exhibit II – Phase 2a Trial Design[2]



In June 2016, Spring Bank dosed its first patient in the CHB Phase 2a trial and we expect top-line data from the first cohort in 2Q:17. Studies are currently taking place in Canada, Korea and Hong Kong with Taiwan coming on when the study begins to recruit for the second cohort. Based on the sequential dosing design for the Phase 2a trial in CHB patients, the potential exists for multiple data readouts from the study in 2017 and the first half of 2018 as the various cohorts are completed. Management may provide updates on the trial as each cohort is completed and the data are fully analyzed.

Results from this Phase 2a trial in CHB patients will be the near-term driver for the stock. We assume, similar to interferon, that a marked reduction in surface antigen after the first 12 weeks will be a strong indicator of the patient's ability to eventually clear the virus. This is supported, among other evidence, by data presented in late 2015 by Gilead using Viread alone and in combination with interferon showing HBsAg levels at a 12-week threshold strongly predicting patient response to therapy.

Phase 2b Trial

The company's current plans for a potential Phase 2b trial in CHB patients anticipate a larger trial with 200 patients. This trial will compare the combination therapy of SB 9200 with a nucleoside/nucleotide analog and SB 9200 alone. The two most effective doses will be employed in the five arms of 40 patients each and since effective doses will already have been determined, the arms can run in parallel, reducing trial duration. We also note that despite engaging over twice the number of patients as the 2a study, the trial cost is only expected to be slightly greater than the 2a cost as Phase 2b will not perform in-depth virological and immunological studies. Following the initial investigatory therapy, patients will be given tenofovir[3] for one year for long term follow-up.

[2] Source: February 2017 Corporate Presentation
[3] The study may use tenofovir alafenamide fumarate (TAF or Vemlidy) instead of the closely related tenofovir disoproxil (Viread) used in the prior studies.

Based on the trial design, and availability of additional funding, we anticipate Phase 2b trials will begin in 2018. Based on the trial size and objectives, we believe the 2b program should last for about a year and provide results in 2019.

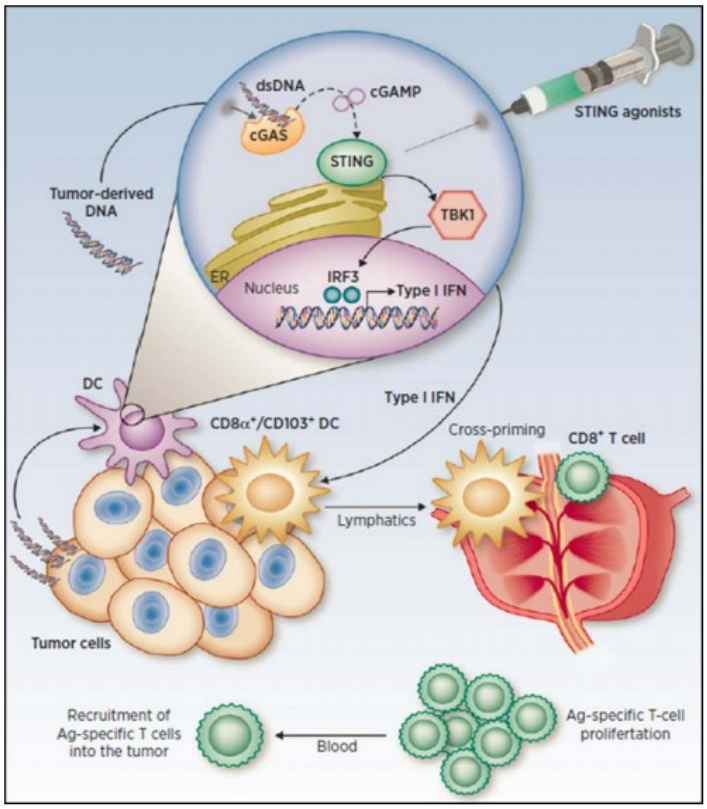
SB 11285 Development Program

Spring Bank first publicly announced its STING program in early September 2016 with a release noting that poster presentations would be made at AACR the following month. On October 20, the company presented scientific data on its novel proprietary STING agonist program, as a potential immunotherapeutic agent for the treatment of selected cancers called SB 11285. The data illustrated that the activation of the STING pathway can induce cellular interferons and cytokines and promote an aggressive anti-tumor response. The agent also stimulates multiple pattern recognition receptors and interferon stimulated genes. SB 11285 has potent immune-modulating and anti-tumor activities and acts through recruiting T-cells, facilitating T-cell trafficking into tumors and stimulating cancer cell apoptosis within the metastasized tumor.

The SB 11285 program is still in the preclinical testing stage and we anticipate preclinical proof of principle results later this year. Initial *in vivo* studies have shown the potential to inhibit lymphoma tumor growth in an A20 syngenic mouse model with dramatic results between the vehicle group and SB 11285 test arm.[4] Assuming the program remains on track and sufficient funding is obtained, we further anticipate an IND filing by second half 2018.

The exhibit below highlights the method of action for STING. Spring Bank's SB 11285 dinucleotide is able to turn on the STING pathway and signal interferon production. In turn, T-cells are activated to recognize the antigens that are expressed on the tumor cells. The T-cells then migrate to the tumor from the lymph nodes through the bloodstream. When the the T-cells reach the cancer cells, they produce enzymes that induce lysis in the cancer cells and the tumor is essentially disolved.

Exhibit III – Activation of STING and Interferon



[4] Graphical representation of the SB 11285 in Syngeneic Lymphoma Model was provided in Spring Bank's April 2017 investor presentation; page 17.

Other Development Programs

Spring Bank is also developing two additional compounds that may function as anti-inflammatory agents. For the first time in its regulatory filings, Spring Bank has higlighted SB 11177 and SB 11179 which, in the company's preclinical studies, have shown anti-inflammatory activity. The compounds belong to the phosphodiesterase type 4, or PDE4, inhibitor class. The current objective for these compounds is to establish pre-clinical proof of principle. Due to the early stage of SB 11177 and SB 11179, we do not attribute any value to them in our discounted cash flow model.

Conclusion

HBV is a global disease that chronically affects 240 million persons in the world and 14 million in the United States and Europe. Currently, there is no cure for HBV and the only currently approved therapies either have very low success rates or merely suppress the virus and require that the patient take the drug indefinitely. SB 9200 has a favorable side effect profile compared to the only other approved immunomodulator and may also offer much higher levels of viral clearance than peginterferon alfa-2a therapy. Based on data in Phase 1 studies, side effects are minimal and no dose limiting toxicities were found.

SB 9200 may show substantially higher efficacy when used as part of a combination therapy with antivirals or a disease modifying agent and we anticipate that the drug will eventually be used in conjunction with these complements when potentially approved in 2022.

The company's lead compound has also shown promise in other RNA viruses such as RSV, rhinoviruses and HIV latency as it is able to upregulate RIG-I and NOD2 proteins which are key players in initiating the immune response. Currently, the technology is focused on stimulating the body's immune response, addressing cancer and reducing inflammation, however, SMNH can target other proteins that can improve a multitude of other disease states.

A functional cure for HBV is extremely valuable as it replaces the current lifetime of therapy for those with chronic HBV and will prevent many of the long-term consequences of HBV including cirrhosis, liver failure and liver cancer. There is a dramatic need for a cure due to the substantial size of the HBV population that is suffering from the chronic form of the disease, and the high level of morbidity and mortality that arise from cirrhosis and hepatocellular carcinoma. Given that there are currently no other functional cures on the market or any that are in an advanced stage of development, SB 9200 has a very strong argument for favorable pricing and substantial penetration if found to be safe and effective.

Key reasons to own:

- **Positive public health environment for the development CHB functional cure**
- **Potential addressable market size of near 4 million patients in developed markets alone**
- **Lack of other effective immunomodulators available in the market**
- **Promising proof of concept data in important animal models for chronic HBV**
- **Well tolerated lead compound with no dose limiting toxicities and promising antiviral activity**
- **Oral therapy superior to infusion and other methods of delivery used for addressing HBV**
- **Fixed duration of therapy**
- **A proprietary technology platform that can be broadly applied in multiple therapeutic indications**
- **Based on cost of current therapies, compound has strong pricing opportunity**

In summary, we remain optimistic regarding the promise of Spring Bank Pharmaceuticals' core technology given the data generated to date and the important disease states pursued by the company's portfolio of dinucleotides. We maintain our target price of $33.00.

PROJECTED FINANCIALS

Spring Bank Pharmaceuticals Inc. - Income Statement

Spring Bank Pharmaceuticals	2016 A	Q1 A	Q2 E	Q3 E	Q4 E	2017 E	2018 E	2019 E
Grant Revenue	**$0.4**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**
YOY Growth	-	-	-	-	-	-	-	-
SB9200	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**
YOY Growth								
	$0	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
YOY Growth								
Total Revenues	**$0.4**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**
CoGS	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Product Gross Margin								
R&D	$14.0	$2.5	$2.8	$2.7	$2.1	$10.1	$12.0	$13.5
G&A	$5.7	$2.0	$1.7	$1.8	$1.8	$7.2	$8.0	$10.0
Other expenses	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Operating Income	($19.4)	($4.5)	($4.5)	($4.5)	($3.9)	($17.3)	($20.0)	($23.5)
Operating Margin	-					-	-	-
Total Other Income	$2.0	($2.0)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Pre-Tax Income	($17.4)	($6.5)	($4.5)	($4.4)	($3.8)	($17.3)	($20.0)	($23.5)
Taxes & Other	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Tax Rate	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
Net Income	($17.4)	($6.5)	($4.5)	($4.4)	($3.8)	($17.3)	($20.0)	($23.5)
Reported EPS	**($2.39)**	**($0.69)**	**($0.48)**	**($0.43)**	**($0.37)**	**($1.75)**	**($1.72)**	**($2.01)**
YOY Growth	-					-	-	-
Shares Outstanding	7.3	9.4	9.4	10.3	10.3	9.9	11.6	11.7

Source: Company Filing // Zacks Investment Research, Inc. Estimates

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