JOINT INDUSTRY
SUBSEA WELL CONTROL AND CONTAINMENT
TASK FORCE

FINAL REPORT on INDUSTRY RECOMMENDATIONS to IMPROVE SUBSEA WELL CONTROL AND CONTAINMENT

March 13, 2012

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1. Introduction

In response to the Gulf of Mexico (GOM) Macondo incident, the offshore oil and gas industry (Industry), with the assistance of the American Petroleum Institute (API), International Association of Drilling Contractors (IADC), Independent Petroleum Association of America (IPAA), National Ocean Industries Association (NOIA), and the United States Oil and Gas Association (USOGA), assembled the Joint Industry Subsea Well Control and Containment Task Force (JITF) to focus on evaluation of subsea well control preparedness and response options. The JITF was not involved in the review of the Macondo incident, nor response; rather, it brought together Industry experts to identify best practices in subsea well control and containment, with the goal of further enhancing safety and environmental protection.

The JITF reviewed technologies and practices for controlling the release of oil from its source, including equipment designs, testing protocols, research and development (R&D), regulations and documentation to determine if enhancements were needed. Early in the process the JITF identified five key areas of focus for GOM deepwater operations:

- Well containment at the seafloor;
- Intervention and containment within the subsea well;
- Subsea collection and surface processing and storage;
- Continuing R&D; and
- Relief wells.

In the aftermath of the Macondo incident, there were 29 specific recommendations made within the above areas of focus.

This final report outlines how the JITF addressed the implementation of each recommendation. The primary focus of the JITF was on potential operational scenarios after a well blowout has occurred. Consideration was also given to containment of hydrocarbons that may leak from subsea production system equipment (e.g. subsea production well) and casing stubs at the seafloor.

The task force did not review Blow-Out Preventers (BOPs), Emergency Disconnect Systems (EDS), BOP Autoshear Systems, Deadman Systems, or ROV equipment used to operate BOPs and/or BOP interfaces (pumps and hot stab). These items were reviewed under the Offshore Equipment Joint Industry Task Force.

2. Timeline

To continue enhancement of safety and environmental protection during oil spill response operations, Industry is committed to creating new, and optimizing existing, standards and providing input to Federal regulatory processes. The JITF's first task was to review the Department of the Interior's (DOI) report titled *Increased Safety Measures for Energy Development on the Outer Continental Shelf*[1] (Safety Report). The JITF's initial recommendations were delivered to DOI shortly after the Safety Report was published, as identified in the timeline provided in Table 1. These initial recommendations were later organized into the 29 recommendations outlined in the September 3, 2010 JITF report, *Draft Industry Recommendations*[2]. The table shows the JITF's progress, including its relationship to Federal policy development and revisions.

[1] http://www.doi.gov/deepwaterhorizon/loader.cfm?csModule=security/getfile&PageID=33598
[2] http://www.api.org/Newsroom/upload/Sub_Sea_Well_Control_3_SEP_2010_V2.pdf

Table 1: Timeline of Events

Joint Industry Task Force	Department of Interior
May 2010	
	27- Releases *Increased Safety Measures for Energy Development on the Outer Continental Shelf*[3] (Safety Report)
June 2010	
Forms JITF, develops subgroups, and identifies key issues	8- Releases NTL No. 2010-05[4] *Increased Safety Measures for Energy Development on the Outer Continental Shelf*, a supplement to the Safety Report
July 2010	
6- Delivers preliminary recommendations to DOI	
September 2010	
3- Provides updated recommendations in the *Draft Industry Recommendations* report, begins implementation 14- Develops whitepaper on *Experience, Role, and Limitations of Relief Wells*	
October 2010	
	14- Publishes the *Oil and Gas and Sulphur Operations in the Outer Continental Shelf– Increased Safety Measures for Energy Development on the Outer Continental Shelf Interim Final Rule*[5] (Drilling Safety Rule) 15- Publishes the Safety and Environmental Management Systems (SEMS) final rule[6]
November 2010	
	8- Publishes NTL No. 2010-10[7] *National Notice to Lessees and Operators of Federal Oil and Gas Leases, Outer Continental Shelf*, a supplement to the Safety Report
Summer 2011	
-Workgroup forms to consider a Recommended Practice (RP) guideline for containment certification for wells with subsea BOP and BOPs on floating structures -Begins work on a RP for capping stacks (RP 17W)	
September 2011	

[3] http://www.doi.gov/deepwaterhorizon/loader.cfm?csModule=security/getfile&PageID=33598
[4] http://www.gomr.boemre.gov/homepg/regulate/regs/ntls/2011NTLs/11-n05.pdf
[5] http://www.boemre.gov/federalregister/PDFs/AD68FEDREG1014.pdf
[6] http://www.federalregister.gov/articles/2011/03/01/2011-4334/oil-and-gas-and-sulphur-operations-in-the-outer-continental-shelf-safety-and-environmental
[7] http://www.gomr.boemre.gov/homepg/regulate/regs/ntls/2010NTLs/10-n10.pdf

Joint Industry Task Force	Department of Interior
	14- BOEMRE/US Coast Guard (USCG) Joint Investigation Team (JIT) releases its final investigative report on the April 20, 2010, *Deepwater Horizon* explosion, loss of life, and resulting oil spill[8]
November 2011	
Develops White Paper for Bureau of Safety and Environmental Enforcement (BSEE)/ Argonne National Laboratory (ANL) Workshop, *Post-Incident containment and Well Control*[9]	

3. Recommendations

One of the first recommendations implemented was to provide a near-term response capability for well containment until longer term projects and capabilities became available. This was achieved through the establishment of collaborative containment companies (such as Marine Well Containment Company (MWCC) and Helix Well Containment Group (HWCG)).

Both companies are joint Industry efforts and involve the same companies that are part of the JITF. They and the JITF are examples of how quickly and effectively Industry can work together to meet a new challenge. The JITF work influenced the formation and capabilities of the new containment companies and as they have developed, they have had involvement with and influenced the JITF.

Both containment companies have a two stage strategy. The first stage is to immediately deliver near term subsea well containment capability. This was achieved by providing access to the subsea containment and well control equipment that was used during the Macondo response. The second stage was to rapidly follow that with building and delivering an expanded well control and containment capability through additional purpose-built equipment.

In the case of MWCC, the expanded well control and containment systems will be entirely new, modular, and purpose-built. These equipment items are being manufactured and will be maintained for future well containment response. HWCG has manufactured and/or purchased similar containment capabilities. The new equipment will be integrated into the interim systems as they become available to add additional support to offshore drilling activities.

These companies and cooperatives provide the special equipment, knowledge and technology needed to quickly and effectively respond to any future event involving loss of containment at the subsea wellhead. Contractual agreements with one or more well control and containment companies provides offshore operators with the necessary well containment response capabilities and also provides Industry with a mechanism to comply with the Bureau of Safety and Environmental Enforcement (BSEE) NTL No. 2010-N10.

In many cases, these containment companies are the responsible party for implementing the recommendations made by the JITF. Table 2 outlines the status of the 29 original JITF recommendations.

[8] http://www.boemre.gov/ooc/press/2011/press0914.htm

[9] http://www.bsee.gov/uploadedFiles/BSEE/Research_and_Training/Technology_Assessment_and_Research/tarworkshops/EWD/WhitePape5_V8_10-17-11_3.pdf

Table 2: Recommendations Status

Description	Original Recommendations	Status
Well containment at the Seafloor		
Establish framework and capability for joint participation and cooperation in the Industry in the area of subsea well control and containment.	01) Immediate Action: Establish coordinated Industry capability for owning and providing subsea well containment technology and capability. Immediate containment capability will exist via acquiring and refurbishing capability used by BP, contracting GOM contractors with immediate existing containment capability, and acquiring containment equipment available off the shelf from suppliers. This immediate containment capability will be provided via containment companies and cooperatives.	Complete: Well containment companies and cooperatives have addressed these recommendations. The industry identified assets and made contractual arrangements for common use in the event of an incident. *Mechanical connection concepts to the seafloor – including suction pile technology – have been technically evaluated. These connections could have connected a containment device entirely over a well stub or complete BOP and affected a seal to the seafloor. Conceivably such a device could contain a very small subsea vent that resulted from a broach. After extensive design review this concept was determined to be technically unfeasible. This was primarily a result of the inability to carefully control the low pressures within the device. Modest positive pressure within the device would destroy any seal. Additionally it was determined that such a device – if feasible – would cover too small an area to address broaching events. Currently, containment companies are developing direct mechanical connection devices to casing stubs at the seafloor as an alternative. Also the current "open water capture devices" that containment companies already can provide could be used above broaches. However they still would address only a small area. Some companies have R&D projects to improve the effectiveness of these devices to separate oil and avoid hydrated problems.
	02) Near term Action: Establish long-term coordinated Industry capability for owning and providing subsea well containment technology and capability. This recommendation and action can be addressed by the MWCC, HWCG or by other containment companies with suitable capabilities and support that are established in the GOM. All containment companies and systems will make use of best practices and lessons learned from the Macondo response.	
	03) Well containment systems should deliver a flexible, adaptable, and rapidly deployable tool kit of containment equipment. The equipment should be purpose-designed and constructed for rapid deployment and successful subsea containment. It should fully contain the oil by complete mechanical connection to the well or to the sea floor.* The containment companies should procure, construct, and test the needed equipment. This includes testing effectiveness over time through drills and readiness reviews. The containment companies should also do research into enhanced methods and equipment for subsea well control and containment.	

Description	Original Recommendations	Status
Remove the Lower Marine Riser Package (LMRP) in the event it is not released as part of the emergency disconnect sequence. Be able to use ROV and surface intervention vessel to unlatch and remove LMRP to get access to the connection mandrel on top of the lowermost BOP.	04) Immediate Action: Confirm LMRP can be removed from lower BOP using a surface intervention vessel and ROV. This should allow access to the mandrel on top of the BOP and the installation of subsea containment assembly (well cap). This assembly (well cap) should have full shut-in capability in addition to choked flow from flow wings. If well flow is necessary it can be achieved by diverting flow to the capture vessels. The subsea containment assembly also allows vertical access to the well for intervention within the well if necessary. In almost all cases where there is confidence in the integrity of the well design, the well can be shut-in and top kill procedures executed. Well "capping" capability is available now through use of a second BOP stack or equipment used in the Macondo incident.* containment companies should expand this capability. ** Some equipment is subject to litigation and not currently available.*	Ongoing: Refer to API Subcommittee on Drilling Well Control Equipment (SC16) and (API RP/Std 53), for further discussion and analysis on the recommendations related to the LMRP release and ROV intervention requirements and testing. Well caps are now available from the containment companies and other containment Contractors. An API work group has formed to address design requirements and functionality of subsea capping stacks (new/proposed API Document 17-W). BOP suppliers have various projects on enhancing BOP performance. Their work is guided by input from API and Industry as well as by their own technical analysis.
Develop new methods to release LMRP without riser tension.	05) Immediate Action: Ensure effective methods to release LMRPs are included in BOP stack designs. This should include releases with no vertical tension is available as when rig is drifting without power. Releases should not damage the BOP or BOP connections. There are tools and techniques available now such as LMRP jacks but new methods should be considered.	
Develop methods for high angle LMRP release without damage and also high angle reconnects.	06) R&D Capability – Ensure effective and non-damaging release of LMRP's. High angle release connectors now exist. This recommendation is to evaluate current high angle release connectors to ensure they fully address high angle release without riser tension or without a riser. There may be no additional technical work required after this study. Additionally the ability to reattach a capping stack to a BOP or wellhead housing that is not vertical should be evaluated. Straightening techniques are available but this would add another option.	
Develop new quick release for risers at	07) R&D Capability – Develop new quick release that can be installed in the lower riser sections to enable quick release and reconnect of	Ongoing: Determined by the JITF to be of low total benefit with high technical complexity. The

Description	Original Recommendations	Status
or above the flex joint/stress joint.	the riser when the LMRP does not release in the emergency sequence.	recommendation is to not pursue at this time. This recommendation is documented and should be re-evaluated to determine possible need/solution at a later date. This can be done by the Federal Government and/or Industry.
Remove damaged or non-functioning BOP stack. Be able to use ROV and surface intervention vessel to unlatch and remove BOP stack to get access to a subsea wellhead.	08) Immediate Action: Remove damaged BOP stack to allow installation of a new BOP on the wellhead housing, or a subsea containment assembly (well cap). With well designs that meet the capability of being capped, the well can be shut-in from release to the external environment via a well cap. This will protect the external environment until the well is killed. This capability is available now through use of a second BOP or well cap from a containment company or other contractor. The containment companies should expand this capability and ensure a sufficient variety of well caps designed specifically for potential future events.	Future: The containment companies and the cooperatives are addressing this issue and JITF recommendation, but should continue their technical assessments to understand future well containment needs.
Regain full control of BOP stack after loss of well control. Be able to repair or replace non-functioning control pods to be able to regain full functionality of BOP stack (ROV intervention can only provide limited functionality).	09) Immediate Action: If a similar failure scenario to Macondo occurs in which the rig has released from the BOP stack but the LMRP is in place and there is no control connection to the pods and/or the pods are not operative – it might be possible to regain full BOP stack control without ROV intervention. Research & Develop Capability: Evaluate possibilities to regain full control over all important BOP functions in the above noted situation.	BOP manufacturers are pursuing improved reliability and operability based on Industry and API input and by their own technical analysis. Additionally, API Std 53 requires regular testing and enhancements of external ROV interfaces on BOP's. As a result it is recommended that this recommendation not be pursued further.
Provide additional and more effective methods of	10) Immediate Action: The containment companies should acquire and maintain a full set of crossover spools, connectors, and hub combinations for connecting to common BOP's.	Complete: As part of the permitting process and NTL 10[10], the operator must demonstrate that they have the capability to respond during a containment

[10] http://www.gomr.boemre.gov/homepg/regulate/regs/ntls/2010NTLs/10-n10.pdf

Description	Original Recommendations	Status
connecting to and controlling BOP's with ROV's.		event. This includes identifying all equipment to be used (e.g., adapters, crossovers, etc.). Standardizing and ensuring proper sizing of ROV stabs is being addressed within API. Thus this recommendation is being fully addressed.
	11) Immediate Action: The containment companies should design and construct subsea connectors to fully seal, connect and contain on damaged connector profiles and casing stubs. Also, consideration should be given to inside well connectors such as packers.	Ongoing: Well containment companies and cooperatives are addressing this recommendation.
	12) Immediate Action: Coordinate with the Equipment Task Force to ensure methods and equipment are providing effectiveness and reliability in delivery of control fluids and control to BOP's and ROV's. Considerations should include an evaluation of methods other than shuttle valves for the ROV intervention plumbing.	Ongoing: The revision of API RP 53 *Blowout Prevention Equipment Systems for Drilling Wells* (soon to be Standard (Std) 53, 4th edition) is addressing this recommendation. Methods other than shuttle valves have not been found to enhance the reliability.
	13) R&D Capability – Review existing methods and number of connection points on existing BOP's. Determine if more outlets or different connections would enhance containment capability.	Ongoing: Refer to API SC16, API Subcommittee on Subsea Production Equipment (SC17), and the RP/Std 53 workgroup to see if it is necessary to develop new a RP or to revise existing RP. It is unlikely that this is necessary to achieve containment and kill. There are already sufficient connect/disconnect points. Additional connections would likely reduce reliability.
Deepwater cutting, metal, and debris removal.	14) R&D Capability - Assess Industry capability and conduct in-situ testing to determine what new technology and capability needs to be developed to remove a debris field and cut equipment like risers. Develop new equipment and capability as determined by testing.	Ongoing: Commercial capabilities currently exist to address this recommendation. Well Control Companies, ROV Manufacturers and Subsea Service Vessels are all addressing this recommendation.

Description	Original Recommendations	Status
Intervention and Containment within the Subsea Well		
Ensure necessary wellhead structural support via design & practices in the event of strong side forces from drifting connected rigs and riser collapse from rig sinking.	15) Immediate Action: Coordinate with API RP 96 and ensure deepwater well design includes a system evaluation of the design and material for subsea well head support (e.g., templates, structural pipe etc.) and the release control methodology of the LMRP.	Ongoing: Industry is addressing this issue with further consideration by the Blowout Risk Assessment (BORA) Joint Industry Project (JIP). Each company should make their own decisions on well design based on individual needs and API RP 96 *Deepwater Well Design and Construction*.
Subsea Stripping and Snubbing Technology to allow intervention inside damaged wells.	16) R&D Capability - Survey Industry for feasibility of developing subsea snubbing technology or consider proposal to Joint Industry Groups to develop preliminary designs for subsea snubbing equipment	No longer a recommendation: This option is no longer necessary. Once a subsea well is secured with a capping device, options such as pumping in to bullhead kill, or planning and drilling a relief well would be evaluated.
Subsea Coiled tubing to allow intervention inside damaged wells.	17) R&D Capability - Seek opportunities to accelerate development of subsea coil tubing deployment systems and make them available for subsea well intervention on damaged wells and BOP's. Consider all possibilities such as deepwater pipe-lay technologies for deploying pipe larger than conventional coil tubing.	No longer a recommendation: It is felt that using top kill or relief wells are better and safer options.
Subsea freeze plug techniques for subsea well containment.	18) R&D Capability - Survey Industry experience, conduct research into basic science if necessary, and undertake field testing to develop Industry capability for establishing and maintaining an "ice plug" to provide subsea well containment while avoiding detrimental effects to the BOP operation.	No longer a recommendation: This is not technically feasible in the deepwater environment or in the characteristics of deepwater wells.
Improvement and Enhancement of Top Kill Methods including evaluation of Reactant Pills and other Bridging Agents for subsea wells.	19) R&D Capability - The top kill method should be considered when the subsea well is contained by the subsea containment assembly or the BOP. This requires well integrity and containment integrity sufficient for the top kill. This effort should include a survey of capability, and development of supporting technologies for converting fluids into barriers in-situ, augmenting bridging if desired, and pumping procedures and planning including hydrate management.	Ongoing: Conventional junkshot can work under certain well situations; however, R&D has shown that junkshot is not generally feasible under high flow rate conditions. It is not feasible to expand junkshot capability. Other kill and control solutions are available and preferred.. Top kill capability must be addressed as part of NTL 10. The capability exists to pump into the well on

Description	Original Recommendations	Status
		most available well caps. This pump in capability will be addressed in API RP17W.
Review the well design criteria of API RP 96 *Deepwater Well Design and Construction.*	20) Immediate Action: The Task Force will coordinate with API RP 96 Deepwater Well Design team to ensure they understand the importance of full shut-in capability to the containment capabilities.	Complete: Transferred to the RP 96 task group under the Offshore Operational Procedures JITF. The RP should fully address and consider shut-in and capping design as required in the BSEE Well containment Check Sheet.
Subsea Collection and Surface Processing and Storage		
Develop means to rapidly deploy production and processing equipment that will effectively interface with containment equipment to convey wellbore fluids to surface for flare and transport.	21) Immediate Action: The Containment Company will deliver a modular solution for capturing, processing, and transporting production from subsea wells that need to be produced until well control is complete. Such a system should be adaptable to deepwater metocean and water depths up to 10,000 feet. Riser systems should be readily deployable and able to accommodate a variety of operational conditions. Processing facilities and capability should be able to be rapidly deployed and easily made functional. All the equipment should be designed to address all the flow scenarios from the IPR work done for NTL-10 as well as pre-constructed, and held on ready stand-by. Any concepts forwarded through BOEMRE's Alternative Response Technologies Program should be evaluated, researched, and included if they enhance capability.	Complete: Addressed by Well Containment Companies and Cooperatives. Enhanced systems will have full 10,000 feet capability. Components of currently available systems can achieve 10,000 feet.
Develop capability to make a full containment connection to the seafloor that can be installed over the BOP's or a casing stub.	22) R&D Capability – The Containment Company will develop, test, and have available technology to provide full containment via seafloor connection of devices intended to fully cover BOP's or well stubs. This system should allow connection of a Subsea containment Assembly so well production can flow to the production and processing system. Such systems should include chemical injection for hydrate mitigation. The sea floor connected containment system would be used for oil capture until a relief well was drilled.	Complete: This was technically evaluated by the Industry and containment companies and determined to not be technically feasible at this time. The focus will be on connecting to damaged wellheads/BOP/s or casing stubs.
Continuing Research and Development		
Extend containment concepts to Subsea	23) R&D Capability – As the next phase of the JITF, evaluate extension of containment concepts, equipment, and capabilities to subsea	Complete: Capabilities currently exist in well containment companies and cooperatives. New

Description	Original Recommendations	Status
Producing Operations and equipment	production operations including production from templates. Make recommendations for enhancing current practices as necessary and appropriate.	capabilities are being developed as necessary.
Education.	24) Immediate Action: Develop a historical context document of marine well control and containment that includes an extensive reference list. This could enhance Task Force work and will be a good base document for the Industry.	Ongoing: The Containment Subcommittee under DOI-led Ocean Energy Safety Advisory Committee (OESAC) (in combination with recommendation #27) is considering this as part of their work vectors.
Evaluate new technology for subsea containment.	25) R&D Capability - Evaluate new and evolving ideas for subsea containment including open capture devices that would have separation capability. R&D should be a key part of the containment companies in which all Industry can participate. All the R&D programs will work collaboratively with appropriate organizations to ensure maximum leverage in the R&D program.	Ongoing: Transferred to Well Containment Companies and Cooperatives.
Relief Wells		
Relief well planning during well planning and permitting.	26) Immediate Action: Via focused workshops, determine and make a recommendation on the most effective methods and information that should be included in well plans regarding relief well drilling planning. Ensure full coordination and eliminate duplication with other groups' initiatives.	Complete: It is not recommended to develop additional requirements beyond those currently in BSEE regulations and requirements.
Technologies for Relief Wells.	27) Immediate Action: Undertake desk research to revisit published work on relief wells.	Complete: A short white paper was completed by the JITF on this subject. No other work is now recommended. If there are other opportunities they should be identified and developed by the containment Subcommittee under OESAC (in combination with recommendation #24).
	28) R&D Capability – Conduct focused interviews with experts and vendors of specialized equipment (ranging tools, etc.), Understand and support, as necessary, plans for developing magnetic ranging tools that don't require tripping the drilling assembly and other equipment that should enhance relief well capability.	Complete: This capability was developed during the Macondo response.
	29) Immediate Action: Write a white paper on relief wells that evaluates the feasibility and desirability of pre-drilling relief wells.	Complete: Please see *Experience, Role, and Limitations of Relief Wells*

4. Conclusion

Industry continues to identify and develop improvements in offshore operations, well design and well control equipment targeted at prevention and containment. Industry is also dedicated to having subsea well containment capability on-call and readily available for any loss of well control. This capability will be properly designed and engineered, purpose built, or a collection of currently available assets. In either event, it should be modular and adaptable to a variety of deepwater conditions. This is being done through Industry sponsor consortium and cooperatives. The JITF's endeavors to provide technical support and assistance to a wide variety of groups and projects, such as:

- The BORA JIP, which intends to develop a Comparative Risk Assessment to reduce overall well blowout risk through researching well design, execution and containment technology[11];
- Sponsoring the International Oil Spill Conference, which provides an opportunity to promote knowledge and allow manufacturers to show their wares, etc. from across the globe; and
- Supporting the BSEE Workshop, *Effects of Water Depth on Offshore Equipment and Operations*, to promote discussion between regulators and Industry representatives. The workshop included a blend of technical presentations and interactive peer review discussions to help: 1) Identify improvements to offshore safety and technologies over the past year; 2) Inspire new ideas; and 3) Help focus regulatory direction. It was conducted by the Argonne National Laboratory on November 1-2, 2011.

Industry remains committed to continuously improve the safety and efficiency of offshore hydrocarbon extraction as well as providing the best possible containment response during subsea well control and containment actions. The JITF has not only released and implemented recommendations, but has also remained engaged in US policy and Industry development afterward. This action fostered an effective process for creating model safety programs in the GOM. Active participation from, and coordination with, the public sector, academia, and other stakeholders has been fundamental to turning initial recommendations into executable and effective plans of action. The JITF supports an Industry initiative to consider development of a Recommended Practice for the content and process of preparing plans and forms for NTL 10 requirements. The JITF participants will continue to be engaged in Industry activities related to subsea containment response.

Subsea well control and containment equipment and response capabilities have been greatly enhanced since the Macondo well incident. Improved safety regulations and Industry Standards require rigorous and more frequent testing of critical well control (BOP) and related equipment items. Equipment and technical resources are being pooled in Offshore Well Containment Companies. These measures significantly enhance the ability of Industry to respond to any future well control incident. Well control and containment equipment is now available to mobilize and deploy to an offshore well in days or weeks rather than months. Additional containment capabilities are being developed and will further enhance the choice of well control and containment options available to deepwater operators, USCG and the Federal Regulatory Agencies (BOEM and BSEE).

[11] https://web-server-1.delmarus.com/Engineering/Joint%20Industry%20Projects/borajip.html