

# **Meeting Minutes 12<sup>th</sup> Meeting of the Environmental Protection and Safety Panel (EPSP)**

**June 1-3, 2011**

**Murchison House, Edinburgh, United Kingdom**

**The 12<sup>th</sup> meeting of the Environmental Protection and Safety Panel was called to order by Barry Katz at 08:52 on June 1, 2011, at Murchison House (British Geological Survey), Edinburgh, United Kingdom.** As part of the meeting opening a brief summary of the Panel's conflict of interest policy was reviewed. It was noted that EPSP operates somewhat differently than the other panels asking that proponents be present during the discussion of their proposal and associated sites. If an EPSP member is a proponent he or she would be excluded from voting. It was noted that Brandon Dugan, a proponent for Proposal 637 (New England Shelf Hydrogeology) was conflicted.

**Colin Graham, meeting host, provided general logistical information and a safety moment highlighting building evacuation procedures if an emergency was to occur.**

**Self Introductions of panel members, alternates, and guests were presented:**

**EPSP members present:** Earl Doyle (alternate for Jerome Schubert), Brandon Dugan, Jennifer Henderson, Martin Hovland, Chiaki Kato, Barry Katz (Chair), Philippe Lapointe, Jean Mascale (alternate for Bramley Murton), Nobuo Morita, Sadao Nagakubo, Yoshifumi Nogi, Kyosuke Onishi, Don Potts, Craig Shipp, Dieter Strack, Manabu Tanahashi (Vice Chair, Toshiki Watanabe,) and Bill Winters

**Guests present:** Jamie Allan, Rick Behl, George Claypool, Neil DeSilva, David Divins, Colin Graham, Javier Hernandez-Molina, John Jaeger, Issa Kagaya, Anne Le Friant, Gilles Lericolais, Mitch Malone, David McInroy, Stephen Midgley, Kyaw Thu Moe, Craig Nicholson, Michael Riedel, and Dorrik Stow

**Agenda was reviewed.** The only change noted from the preliminary agenda was that there would be no review of SPC activities.

**Minutes for the 11<sup>th</sup> EPSP meeting were approved as presented.**

**Mitch Malone reviewed USIO operations that were considered relevant to EPSP.** The presentation began with an overview of recent *Joides Resolution* expeditions. These included: 1) Expedition 327-Juan de Fuca; Expedition 328-Cascadia ACORK; 3) Expedition 329-South Pacific Gyre Microbiology; 4) Expedition 330-Louisville Seamounts; 5) Expedition 334-Costa Rica Seismogenesis Project; and 6) Expedition 335-Superfast 4. The FY12 schedule was reviewed. It was noted that transit has become a growing issue with *Joides Resolution* operations and that the schedule has changed twice since its original development. These changes included the postponement of Expedition 341-Southern Alaska Margin. Changes in the drilling program were communicated by the USIO to the community at large which resulted in a response from the NSF. (Jamie Allan forwarded this response to the EPSP Chair. This

letter is included on the final meeting CD.) The USIO education and outreach program was also reviewed as were USIO technical activities including a series of project reviews, among which were the lessons learned from the ship rebuild program.

**Colin Graham provided an ESO update.** It was reported that Expedition 325-Great Barrier Reef Environmental Changes was the last MSP and that was completed early in 2010. It was reported that there are six mission specific programs at OTF. At least one MSP expedition will take place prior to the end of the current program, and possibly two depending on available funds and operational costs. Scoping activities have begun on Proposal 548-Chixulub Impact Crater and Proposal 716-Hawaii Drowned Reefs. Scoping discussions are planned for two additional proposals: Proposal 758-Atlantic Masif and Proposal 672-Baltic Sea Basin Paleoenvironment. It was also noted that ESO will be reviewed by ECORD. The Panel was advised that there may be a need for an out of cycle EPSP review depending on proposal selection and timing of operations for the next MSP expedition.

**Kyam Thu Moe presented an update of CDEX activities.** Changes in the CDEX structure were noted including the consolidation of the logging team from IODP into the CDEX G&G group. The presentation continued with a brief overview of the four *Chikyu* expeditions conducted since the last meeting of the Panel. These included Expedition 326 – NanTroSEIZE Stage 3 Plate Boundary Deep Riser 1; Expedition 331 – Deep Hot Biosphere; Expedition 332 – NanTroSEIZE Stage 2 Riserless Observatory; and Expedition 333 – NanTroSEIZE Stage 2: Subduction Inputs 2 and Heat Flow. This review was followed by a discussion on the impact of the tsunami following the March 11, 2011 earthquake on the ship and operations. The *Chikyu* was docked at the time of the tsunami and damage including the dropping of an azimuth thruster and the tangling of the anchor chain occurred. The full extent of the damage was being assessed at the time of the meeting but drilling plans for 2011 (Expedition 337 – Deep Coalbed Biosphere) have been deferred. The potential *Chikyu* operational window was presented along with four possible drilling operations including a “rapid response” of the Tohoku Earthquake.

**Barry Katz reviewed EPSP actions between meetings.** Key activities were the electronic review of 15 sites for Expedition 336 – Mid-Atlantic Ridge Microbiology. Approval was recommended for all sites as requested. With all holes planned for termination in basement the Panel recommended the approval of the request by the proponents to be able to deepen any of the holes as scientific or operational needs require. The panel also recommended the approval of contingency site C9001-1A to a depth of 365 meters. The panel recommended approval of the request to position the site within a circle with 100 meter radius from the identified center-point, but limited the site to northeast or southeast of the center point because of potential shallow gas west and south. The panel also requested careful hydrocarbon monitoring below 350 meters. A conference call was conducted to discuss a potential go-forward plan for Proposal 705 – Santa Barbara basin. It was decided that a full review would be conducted by the Panel at the upcoming June 2011 meeting. The panel also completed a review of the LWD monitoring program for CRISP Expedition 334 and recommended the approval of the proposed program. The Panel also reviewed the proposed abandonment program for Expedition 334. A majority felt that the proposed use of heavy mud was acceptable and that hole collapse after abandonment would most probably result in the sealing of the holes.

**Gilles Lericolais presented a report on the 14<sup>th</sup> meeting of the Site Survey Panel (SSP).** He provided a listing of the proposals reviewed by SSP, their current stage within the program, and the assigned watchdogs. The SSP's mandate and classification scheme was presented to familiarize the EPSP membership. Detailed site classifications were presented for proposals at OTF (Proposal 633 - Costa Rica Mud Mounds, Proposal 637 - New England Shelf Hydrogeology, Proposal 644 - Mediterranean Outflow, Proposal 677 - Mid-Atlantic Ridge Microbiology, Proposal 681 - Lesser Antilles Volcanic Landslides, Proposal 686 - Southern Alaska Margin 1:Climate-Tectonics), with SPC (Proposal 595 - Indus Fan and Murray Ridge), and with SSEP (Proposal 704 - Sumatra Seismogenic Zone, Proposal 770 - Kanto Asperity Project: Observatories, Proposal 771 - Iberian Margin Paleoclimate, Proposal 776 - Deep Sea Drilling in the Arabian Sea, Proposal 778 - Tanzania Margin Paleoclimate Transect, and Proposal 553 - Cascadian Margin Hydrates). In addition, SSP reviewed nine APLs. Lericolais also noted: 1) that the panel considered the termination of SSP meetings premature and that significant issues still remained on future expeditions; 2) the lack of US alternates at the last panel meeting had a negative impact on the effectiveness of the panel; and 3) "MATRIX" needed to be modified to address hydrogeology proposals. A discussion was held concerning the differences between EPSP and SSP requirements for a positive recommendation and the need for better communication between panels. It is recommended that if a location change is made that the SSP liaison to EPSP notify the SSP chair so that a recommendation can be made to SPC as to whether sufficient data are available in the database to support the science plan at the new location.

**Issa Kagaya provided the IODP-MI report.** This report included a summary of the proposals currently in the system and drilling plans as currently defined. A review of the new draft SAS structure was presented. EPSP will move forward without significant change in the new structure. In the future EPSP will have liaison activities with PEP (Proposal Evaluation Panel), SIPCom (Science Implementation and Policy Committee), and SCP (Site Characterization Panel). The liaison activities with PEP suggest that EPSP may become involved with the review process earlier in the proposal cycle. A brief discussion of the Project Mohole scoping was held, with three candidate locations identified in the Pacific basin. (The initial feasibility study has been included in the EPSP meeting CD.) EPSP was also informed that a DPG is currently underway to respond to the March 11<sup>th</sup> earthquake in Japan. If a decision is made to go forward an August 1<sup>st</sup> proposal deadline will exist. The presentation concluded with notice of a change in the IODP-MI office location to Tokyo as well as staffing changes at IODP-MI.

**Stephen Midgley presented a brief review of USIO operational contingencies.** Panel members were reminded of the limitations and general operations of the *JOIDES Resolution*, most significantly was the lack of a mud circulation system, BOPs and choke and kill lines. Bottom hole pressure can, therefore, be influenced but not controlled. Kicks are determined through gas monitoring, ocean surface observations, the loss of pressure during LWD operations, backflow through the drill pipe, fluctuating standpipe pressure, and subsea observations. In the case of hydrocarbon flow there remain limited response options. These include the increase in the circulation rate, which increases pressure, the use of pump kill mud, and cementation. If flow is uncontrollable in deepwater the operation would be to pull out of hole and move off. In shallow water the operation would be to move off hole without pulling out. The Panel was reminded that their reviews were the first line of defense by attempting to ensure

safe operations. It was noted that there are additional procedures for shallow water (75-350 meters) operations, drilling BSRs, hydrate drilling, and for working in areas with the potential for H<sub>2</sub>S. A series of technical notes on these operations and monitoring are available at the TAMU website (and are included in the final meeting CD).

**Anne Le Friant presented a review of Proposal 681 – Lesser Antilles (Expedition 340).** The presentation began with a brief review of the scientific goals and objectives of the proposal. These objectives include the documentation of the constructive (volcanic products from eruptions) and destructive processes (both slow processes, such as subsidence and erosion, and rapid processes, such as caldera and flank collapse) of the Lesser Antilles volcanic arc. The drilling program was designed to use the marine tephrochronologic record to fill in the gaps present onshore and to characterize the spacial and temporal variations along the arc. Of particular importance to the program is the documentation of large debris avalanches. It is believed that this work could lead to a better understanding of tsunami risk and the frequency of volcanic activity in the region. After the scientific objectives were presented to the panel a site-by-site review was completed.

SITE	LATITUDE	LONGITUDE	DEPTH (mbsf)	RECOMMENDATION
CARI-01C	16°30.48523'N	62°27.10210'W	145	Recommended for approval as proposed
CARI-02C	16°43.13150'N	62°05.04804'W	275	Recommended for approval as proposed
CARI-03C	16°38.42774'N	62°02.29414'W	270	Recommended for approval as proposed
CARI-04C	---	---	---	Not recommended for approval. New location recommended.
CARI -04D	16°29.59914'N	61°57.08637'W	270	Recommended for approval at new location
CARI-05C	---	---	---	Not recommended for approval. New location recommended.
CARI-05D	15°00.51666'N	61°37.99998'W	395	Recommended for approval at Line 47 CDP 1.05
CARI-07C	14°32.58355'N	61°27.54945'W	560	Recommended for approval as proposed
CARI-08B	14°23.24299'N	61°42.68805'W	320	Recommended for approval as proposed
CARI-09B	14°16.69942'N	61°53.34233'W	290	Recommended for approval as proposed
CARI-10B	14°54.40832'N	61°25.3531'W	345	Recommended for approval as proposed
CARI-11A	14°54.06'N	61°25.698'W	345	Recommended for approval as proposed
CARI-06C	14°38.87008'N	61°55.08338'W	535	Recommended for approval

				as proposed
<b>CARI-12A</b>	14°39.102'N	61°25.08'W	550	Recommended for approval as proposed
<b>CARI-13A</b>	16°44.32278'N	62°02.57508'W	100	Recommended for approval as proposed
<b>CARI-14A</b>	16°43.6872'N	62°02.2299'W	105	Recommended for approval as proposed

Le Friant confirmed that there are no known issues associated with endangered species, marine mammals, submarine cables, or man-made hazards.

**Dorrik Stow presented the scientific goals and objective of Proposal 644 Mediterranean Outflow (Expedition 339) as part of a final review.** The focus for the expedition was the growing interest in bottom currents and associated contourites because of their importance in basin analysis, paleoceanography/paleoclimatology, slope stability, hydrocarbon exploration, and mineral exploration. The primary objectives for the proposed expedition were to: 1) gain a better understanding of the opening of the Gibraltar Gateway and the onset of the Mediterranean Outflow Flow (MOW); 2) determine MOW paleoceanography and its climatic significance; 3) establish a marine reference for Pleistocene climate change; 4) identify sea level changes and sediment architecture of the Cádiz contourite depositional system (CDS); and 5) determine the importance of synsedimentary neotectonic control on the evolution of CDS. Some of the specific questions being examined are whether the opening of the Gibraltar Gateway was a two phase event and what has been the influence of MOW on thermohaline circulation and global climate. The planned program should also help to examine how external factors such as changes in sea level may influence MOW through time.

**The first day of the meeting was recessed at the conclusion of the scientific overview at 17:05.**

**The meeting was called back to order on June 2, 2011 at 08:55.**

**Javier Hernandez Molina presented the site-by-site review for Proposal 644.**

SITE	LATITUDE	LONGITUDE	DEPTH (mbsf)	RECOMMENDATION
<b>GC-01A</b>	36°49'41.29"N	7°45'19.63"W	526	Recommended for approval as proposed
<b>GC-09A</b>	36°48'18.99"N	7°43'08.56"W	784	Recommended for approval as proposed
<b>GC-04C</b>	---	---	---	Not recommended for approval. New location recommend.
<b>GC-04D</b>	36°25'31.058"N	7°16'41.312"W	1550	Recommended for approval at crossing SA81A@NO7 and SA81A@N16
<b>GC-02B</b>	36°19'02.38"N	7°43'04.89"W	350	Recommended for approval to revised depth)(original

				request was for 433m)
<b>GC-05B</b>	---	---	---	Not recommended for approval.
<b>GC-11A</b>	36°25'31.05"N	7°16'41.31"W	650	Recommended for approval as proposed
<b>WI-01B</b>	37°21'32.53"N	9°24'39.41"W	675	Recommended for approval as proposed
<b>GC-10B</b>				Not recommended for approval
<b>GC-10C</b>	36°16'1.28"N	6°47'27.63"W	991	Recommended for approval at crossing CADIZ-21 and SA81A@N07

Positions of submarine cables and an explosive dump needs to be confirmed prior to spud-in. The potential gas hazard is considered very limited. There appears no seismic evidence to indicate the presence of shallow gas. Based on industry drilling in the region any overpressure that may exist is believed to be deeper than any of the planned penetrations. No issues with marine mammals or endangered species were identified.

**A review APL-763 Iberian Margin Paleoclimate was included in the Proposal 644 discussion.**

SITE	LATITUDE	LONGITUDE	DEPTH (mbsf)	RECOMMENDATION
SHACK-04A	37°34.29'N	10°7.57'W	150	Recommended for approval as proposed

**Michael Riedel presented the safety review for Expedition 311 Phase II – Cascadia Gas Hydrate Observatories.** A brief summary of the expedition's scientific objectives was presented as well as the results of the first phase of drilling at Cascadia. It was noted that phase II was required because the original program was only partially implemented – no CORKs were placed. Phase II essentially deals with CORK placement. The CORKs will be connected to the Neptune-Canada system. The Cascadia program has three general objectives: 1) capturing long-term and episodic fluid migration fluxes; 2) constraining gas hydrate formation models; and 3) determining the linkage among microbiology, pore-fluid geochemistry, and sediment geochemistry (including microbial responses to earthquake induced fluid migration). Highlights from the first phase of drilling were presented: 1) hydrates were spatially limited; 2) gas hydrates were observed in sandy turbidites and fractures; and 3) there was significant variability in the abundance of hydrates in closely spaced holes. A site-by-site summary was presented. The panel did not re-examine Site CAS-04B, which had been previously approved.

SITE	LATITUDE	LONGITUDE	DEPTH (mbsf)	RECOMMENDATION
<b>CAS-08A</b>	---	---	---	Not recommended for approval. New location

				recommended.
<b>CAS-08B</b>	48°34.9153'N	127°6.9124'W	250	Recommended for approval at new location ODP7MC99 CDP 2750
<b>CAS02-CORK-Alt-1</b>	48°41.5366'N	126°52.1621'W	350	Recommended for approval as proposed
<b>CAS02-CORK-Alt-2</b>	48°41.2524'N	126°53.6408'W	350	Recommended for approval as proposed
<b>CAS02-CORK-Alt-3</b>	48°40.9834'N	167°53.3544'W	350	Recommended for approval as proposed
<b>CAS02-CORK-Alt-4</b>	---	---	---	Not recommended for approval. New location recommended
<b>CAS02-CORK-Alt-4B</b>	48°39.2636'N	126°52.805275'W	350	Recommended for approval at new location CRL48-XL07 shot point 1334.0
<b>CAS03-CORK</b>	48°40.0396'N	126°51.0492'W	350	Recommended for approval as proposed. Verification that no live vent community exists at the site is required prior to drilling
<b>CAS04-CORK</b>	---	---	---	Not recommended for approval. New location recommended
<b>CAS05-CORK</b>	48°40.1797'N	126°50.8502'W	350	Recommended for approval on line CRL48-XL07 shot point 2569 – Replacement for CAS04-CORK

Discussions noted that precautions should be made for encountering H<sub>2</sub>S during sampling. Significant core expansion may also occur as a result of hydrate composition. Although unexploded ordinance has been dumped in the region proposed sites appear to be more than 5 nautical miles from the defined areas. Proponents will need to be sensitive to marine mammals.

**John Jaeger reviewed Proposal 686 Southern Alaska Expedition 341.** His presentation began with the expedition's scientific goals and objectives. These goals include: 1) documenting tectonic responses to climate change during the Plio-Pleistocene (i.e., impact of climate changes on exhumation rates and the associated tectonic responses to unloading); 2) establishing the timing of the advance and retreat phases of the Southern Alaskan Cordilleran ice sheet; 3) examine the source-to-sink relationship in a high latitude continental margin sequence; 4) documentation of the temporal behavior to the geomagnetic field in a largely unsampled region through the collection of a high resolution record; and 5) understanding how climatic fluctuations affect primary productivity within the region. Following the scientific discussion a site-by-site review was conducted.

SITE	LATITUDE	LONGITUDE	DEPTH (mbsf)	RECOMMENDATION
<b>KB-2A</b>	59°31.93'N	144°08.03'W	417	Recommended for approval as proposed
<b>GOAL-15C</b>	59°41.3394'N	143°12.0552'W	1225	Recommended for approval as proposed
<b>GOA15-1A</b>	59°42.0600'N	143°07.2012'W	1200	Recommended for approval as proposed
<b>GOAL-17B</b>	59°30.4398'N	143°02.7378'W	1045	Recommended for approval as proposed
<b>GOA16-1A</b>	58°46.6122'N	144°29.5968'W	1100	Recommended for approval as proposed
<b>GOA16-2A</b>	58°46.3476'N	144°30.1200'W	1100	Recommended for approval as proposed
<b>GOAL-16B</b>	58°46.1750'N	144°29.7917'W	1100	Recommended for approval as proposed
<b>GOAL-18A (Redrill of Site 178)</b>	56°57.38'N	147°07.86'W	856	Recommended for approval as proposed

Locations are within marine mammal migration paths. Contingency plans need to be in place prior to the start of expedition. Not an active fishing ground. Cruise ships present in the region.

**Brandon Dugan presented a preview of Proposal 637 - New England Shelf Hydrology.** The presentation began with an overview of the scientific goals and objectives of the proposal. The primary objective of the proposed drilling program was the identification of the origin of offshore freshwater. Specifically the program was designed to determine whether meteoric recharge and local flow cells are responsible or if the water is a result of subglacial recharge and proglacial lakes. The specific scientific objectives are: 1) establish distribution of freshwater, fluid pressure, and temperature; 2) determine ground water age; 3) establish emplacement mechanism; 4) determine origin of fluid pressures; 5) establish concentrations of methane and nutrients and their controls; 6) characterize rates of decomposition of organic matter, redox processes, and microbial communities involved; 7) establish long-term methane and nutrient fluxes; and 8) determine whether ice sheet meltwaters had any influence on methane production. To accomplish these objectives hydrogeochemical, microbiological, isotope, and noble gas data will be collected along with hydraulic properties and fluid pressures. Following the scientific overview a site-by-site review was undertaken.

SITE	LATITUDE	LONGITUDE	DEPTH (mbsf)	RECOMMENDATION
<b>MV-1C</b>	41.1936°N	70.4350°W	350	No issues identified
<b>MV-2B</b>	41.1171°N	70.3953°W	350	No issues identified
<b>MV-3C</b>	40.8746°N	70.2697°W	550	No issues identified
<b>MV-4B</b>	---	---	---	Not recommended for approval. New location



				recommended.
<b>MV-4C</b>	40.6185°N	70.1370°W		Positioned 250 meters south of the original position for MV-4B on EN465 Line 1 to a depth of 450 meters
<b>MV-5B</b>	40.3771°N	70.0119°W	650	No issues identified
<b>MV-7A</b>	40.42248°N	69.85826°W	650	No issues identified
<b>MV-8A</b>	40.9976°N	70.3334°W	350	No issues identified
<b>MV-9A</b>	---	---	---	Not recommended for approval. New location recommended.
<b>MV-9B</b>	40.33204°N	69.83924°W	650	Position 250 meters south to common depth point (CDP) 4280 on EN465 Line 5

No significant hydrocarbon risk was identified but mild overpressure may be present. Because these represent shallow water sites an independent shallow hazards survey will need to be completed and presented to EPSP before a final recommendation for approval can be made. The panel also expressed concerns that there will be a need to isolate freshwater reservoirs from salt water zones after drilling. The proponents are aware of potential mammal and fisheries issues and believe that they can be mitigated within the operational plan.

The Panel noted that site-specific geohazards surveys, including a grid of high resolution seismic data will be required before final approval of all sites. A geotechnical survey may also be required depending on the type of drilling vessel. These surveys will be coordinated by the operator. The Panel will review the geohazards survey when completed.

**The meeting was recessed at the conclusion of the preview of Proposal 637.**

**The meeting was called back to order on June 3, 2011 at 08:45.**

**Jamie Allan provided a high level overview of the next steps for Proposal 705 – Santa Barbara basin after it receives a recommendation for approval from EPSP.**

**Richard Behl reviewed the scientific objectives of the proposal.** It was noted that there were two primary objectives – the creation of a marine stratigraphic reference section for the late Quaternary and gaining an understanding of the mid-latitude ocean/climate behavior across the Mid-Pleistocene. The proposed location of the expedition is considered ideal because of the potential to gain a high resolution record and because it is located at a mixing point. Prior drilling in the region at Site 893 penetrated to 200 mbsf or ~160ka.

**This discussion was followed by a site-by-site review led by Craig Nicholson.** It was noted that the sites were located on the Mid-Channel Trend and that because of the basin's history as a hydrocarbon producing province significant sub-surface data are available. As a result of the general inability of the

Panel to recommend the approval of the proposed sites all proponents were asked to leave the room so that a go-forward plan could be developed. As a result of the discussions it was determined that the proponents were asked to present another review to the panel reexamining the proposed locations and developing a safety package that would provide the necessary data so that the panel has a clear understanding of the geology that may be related to the distribution of hydrocarbons and the potential for traps. The Panel's requests are highlighted below.

SITE	LATITUDE	LONGITUDE	DEPTH (mbsf)	RECOMMENDATION
SBC-01A	---	---	---	Could not be approved as proposed with available information
SBC-01B	---	---	---	Could not be approved as proposed with available information
SBC-01C	34°17.87'N	120°00.02'W	1350	Determined that approval at SP850 on MV08-Transit ED-AG to a depth equivalent to 2.11 seconds two-way travel time would be possible pending completion of a shallow hazards survey and determination that that the site is free of shallow hazards
SBC-02A	---	---	---	Could not be approved as proposed with available information
SBC-02B	---	---	---	Could not be approved as proposed with available information
SBC-03C	---	---	---	Could not be approved as proposed with available information

**The proponents need to supply to the EPSP Chair and to IODP-MI completed safety sheets Site SBC-01C. The panel also recommends that an alternate for Site SBC-01C be developed in case a shallow hazard is identified or if there are problems encountered during drilling.**

**At the next proposed review the panel has requested the following material be provided:**

- **Area specific (not regional) maps**
  - **Multibeam**
  - **Backscatter**
  - **Side-scan**
  - **Interval amplitude maps per interval**
    - **RMS amplitude**
    - **Minima – extremum**
  - **Structure contour maps for each interval – appropriate contour intervals**
- **Core hole paths located away from amplitude anomalies, not at the stop of a structure with closure, can be on the flank, (best if a bed is exposed at sea floor). (i.e., positioned outside of structural closure, or if on a closure, all strata penetrated need to outcrop updip on the seafloor)**
- **The entire section proposed for drilling must be clearly imaged in the seismic data**
- **Site locations should not have any indications of shallow gas (i.e., away from seismic anomalies)**
- **An attempt should be made to locate on crosslines – primary line on site survey data; crossline may be industry data.**

**Final approval for any of the Santa Barbara sites will require successful review of a shallow**

**Assuming a need, the next EPSP meeting will tentatively be held in June 2012 in College Station, TX. Mitch Malone will be meeting host.**

**Panel members thank Colin Graham and the BGS team for their hosting of the meeting. The facilities and support by all was excellent.**

**Meeting was adjourned at 17:00.**