March 23, 2005

Via Facsimile (279-4239) and U.S. Mail

Herbert H. Ray, Jr., Esq.
Keesal, Young & Logan
Suite 650
1029 West Third Avenue
Anchorage, AK 99501-1954

Re: M/V *Selendang Ayu* Incident – Cooperative Salmon Study

Dear Bert:

I am writing to follow up on the agreement reached during our meeting on Monday, March 7, 2005, concerning the participation of the responsible parties (RPs) in a pre-assessment study proposed by the National Oceanic and Atmospheric Administration (NOAA) entitled *Evaluation of Risk to Salmon Early Life Stages Near the Selendang Ayu Spill Site*, a copy of which is attached. I understand that representatives of NOAA and Polaris have mutually agreed with respect to this study that:

1. This work will be initiated during a period of approximately 8 days, commencing on or about March 14, 2005, in Dutch Harbor, Alaska, in accordance with procedures described in the attached sampling proposal (Attachment 1). A second period (dates to be determined) will follow as noted in #7.

2. These initial activities will involve acquisition of numerous samples, but decisions as to which will be analyzed will be mutually decided at a later date (exception—see # 6 below).

3. The work will be conducted from a Polaris-chartered support vessel in Skan and Makushin Bays in the vicinity of the *Selendang Ayu*, with a total of 8 streams sampled, ideally four streams in each bay, three of which have been oiled to some extent and a fourth that is an apparently un-oiled control stream.

FWS. 1835
Attachment 2

4. A representative of Polaris will accompany the NOAA field party from the National Marine Fisheries Service (NMFS) Auke Bay Biological Laboratory, and will be allowed to observe all activities associated with deployment of polyethylene membrane devices (PEMDs), and the acquisition of salmon alevins, sediments, and mussels.

5. Sampling in each stream will generally involve up to four components:
   - deployment of up to 8 PEMDs, to be used as passive hydrocarbon samplers;
   - acquisition of up to four samples of pink salmon (Onchorynchus gorbuscha) alevins to be used as media to potentially evaluate uptake of petroleum hydrocarbons and cytochrome P4501A (CYP1A) induction;
   - acquisition of up to 12 sediment samples to supplement PEMD information and allow a general picture of substrate contamination (or absence thereof) in and around stream channels; and,
   - if present, two samples of mussels (Mytilus sp.).

6. With the exception of the PEMDs, all other samples acquired during this work will be preserved in an appropriate manner and archived until a mutually agreed decision is reached on the disposition of those samples.

7. Further with regard to sample analyses, the PEMDs will be retrieved after a 20-60 day deployment, and analyzed for the presence and concentration of 79 hydrocarbons (28 alcanes and 51 polynuclear aromatic hydrocarbons (PAHs)). Based upon a mutual evaluation of results for the chemical analyses of the PEMDS, decisions will be made as to whether additional analyses will be performed, and on which samples.

8. The RPs will pay all costs associated with performing the study and chemical analyses. Costs which will be paid directly by the RPs include the costs of providing a vessel for the purpose of transporting the study participants from Dutch Harbor, Alaska to the locations where field work will occur. Costs to be reimbursed by the RPs within thirty (30) days of receipt of appropriate cost documentation include, but are not necessarily limited to, travel and transportation costs of NOAA personnel from their duty stations to Dutch Harbor, labor costs, per diem, and indirect costs, equipment and supplies, and costs of laboratory analysis.

9. If all parties are unable to agree on further chemical analyses or which samples to analyze, the trustees reserve the right to conduct analyses of the samples independently at their expense.

10. Further, it is understood that at any time the trustees and RPs have the opportunity to mutually agree to forgo any aspects of the planned study and proceed directly to appropriate restoration planning and execution.

If the RPs are in agreement with the terms of the study as described above, please sign the acknowledgment line below and return to me (my fax number is 206-526-6665) by the close of business on March 30, 2005.

I look forward to hearing from you.

Sincerely,

Craig R. O'Connor

By signing on the line below, I acknowledge that the RPs are in agreement with the terms set forth above pertaining to the study entitled *Evaluation of Risk to Salmon Early Life Stages Near the Selendang Ayu Spill Site.*

_____ _____

Signature Date

Enclosure

cc: Rob Wolotira, NOAA
John Cubit, NOAA
Regina R. Belt, U.S. Department of Justice
Lisa M. Toussaint, Office of the Regional Solicitor
Alex M. Swiderski, State of Alaska

Attachment 1

Proposal: Evaluation of risk to salmon early life stages near the Selendang Ayu spill site

Proposers: Mark Carls and Stanley Rice, Auke Bay Fisheries Laboratory, Alaska Fishery Science Center, NMFS, 11305 Glacier Highway, Juneau, Alaska, 99801

Mark Carls 907-789-6019 mark.carls@noaa.gov
Stan Rice 907-789-6020 jeep.rice@noaa.gov

Salmon stream survey design

Purpose: determine if Selendang Ayu oil has contaminated salmon streams and the early life stages of intertidally- spawned salmon. This will determine the present risk to pink salmon and provide a basis for future risk assessment.

Background: Dissolved toxic constituents can drain from oil stranded in intertidal shorelines into intertidal reaches of streams. This mechanism was first demonstrated after the Exxon Valdez oil spill in Prince William Sound. Dye studies demonstrated gravity-driven groundwater flow from intertidal substrate into stream channels, including the hyporheic zone utilized by developing pink salmon embryos (Carls et al. 2003). Low-density polyethylene passive sampler devices (PEMDs) detected a polynuclear aromatic hydrocarbon (PAH) concentration gradient in at least one affected stream a decade after the spill, demonstration of the long, slow release from stranded intertidal oil (Carls et al. 2004). Current information suggests that oil from the Selendang Ayu has or is in the process of stranding in upper intertidal substrate, thus similar toxin time-release may adversely affect salmon alevins and embryos in affected streams. Because of the physical nature of bunker oil, it is possible that stranded oil will release multi-ringed PAH for a considerable time period. However, because the physical nature of the stranded bunker oil is significantly different from crude oil, it is difficult to directly extrapolate those observations to this situation. An on-site sampling assessment will be needed.

Objectives:

1. Determine bioavailability of PAH in spawning areas of 6 oiled and 2 control streams near the spill site (relative concentrations in passive samplers and PAH fingerprint)
2. Determine PAH exposure in pink salmon alevins pumped from oiled stream mouths near the spill site, using CYP1A induction techniques
3. Map oiled areas at/near target streams with particular attention to relationship between tide height, spawning gravels, and oiled substrate
4. Determine bioavailability in marine waters near the mouths of salmon streams where out-migrating fry might first feed and reside.
5. Determine concentration and fingerprint PAH in secondary samples of stream/bank sediment and mussel tissues to augment the passive samplers collections (to aid in interpretations)
6. Synthesize the data to evaluate risk to salmonids spawned near oiled stream banks or out-migrating fry from oiled streams near the spill site.

Conceptual design: To determine bioavailability in different stream/estuary locations, passive samplers (polyethylene membrane devices (PEMDs) will be placed at varying stream elevations within stream channels to sample dissolved oil constituents for approximately one month. These samplers are very sensitive; accumulated hydrocarbon concentrations will be 10^4 to 10^5 times those in contaminated water. If dissolved oil is not present, hydrocarbon concentrations in PEMDs will be negligible. If dissolved petroleum is present, concentrations will be elevated and should increase downstream; PAH composition will be consistent with the dissolved phase of the source oil. To determine current exposure, pre-emergent alevins pumped from stream gravel will be inspected for cytochrome P4501A (CYP1A) induction. CYP1A is induced by planar hydrocarbons such as PAH; induction provides evidence of recent or ongoing exposure. Induction in embryos is linked to adverse affects that reduce the lifetime survival potential of survivors. By sampling above oil influence and in non-contaminated streams, the source of the CYP1A induction can be ascribed to oil exposure (as opposed to other possible sources) if present only in the samples from oiled stream mouths. In addition to the sampling at targeted spawning zones, Acold controls@ will be sampled in each stream upstream of any contamination (alevins and PEMDs) and Ahot controls@ (PEMDs only) will be sampled downstream and in the estuary near stranded oil. Nearshore marine water will be sampled to determine if intertidal hydrocarbons are coming from this alternative potential source. Ancillary hydrocarbon samples (alevins, sediment, and mussels) will be collected to develop a complete picture of site contamination. Ancillary samples will be archived; positive PEMD results could trigger analysis.

Advantage of passive sampling: The sampling devices are very sensitive and will easily identify potential problem areas. Because the sampling is passive, intermittent exposures driven by tidal pumping or transient movement of oiled substrate will capture exposure events even if they are not continuous.

Sample design:

Expectations: Oil will be stranded in upper intertidal areas around streams and perhaps at lower elevations. Preliminary observations also suggest the possibility that oil was blown well above the high tide line in some stream systems. **Sampling strategy will be adapted to understand this or other contingencies as they are discovered in the field.**

Beach & stream assessment: In 2 bays, streams and beach will be evaluated; three heavily oiled streams + 1 non-oiled reference stream per bay.

Σn = 8 streams

PEMD & alevin sample elevations for bioavailability assessment–

Intertidal PEMD placement at each stream (Fig. 1):

a. One PEMD will be placed in FW, as a "cold Control", above tidal and oil influence

b. Four PEMD's will be placed at varying tidal heights within the stream.

c. At least one PEMD will be placed in the estuary relative to the stream, as an assessment of the estuary receiving habitat for the emergent fry.

d. Two PEMD's will be placed just downslope from adjacent high intertidal oil patches near the steam mouth (hot controls, n = 2). Σn = 8 PEMDs/stream.

e. Quality assurance blanks: One PEMD will be opened per day as an air blank (in the skiff cooler with the other deployment PEMDs on both the deployment and retrieval trips. In addition, One PEMD will make each trip, but not be opened. Lab blanks will be retained within the lab from the selection of strips during the loading process. Solvent blanks will be retained within the lab also.

f. Total number of "stream" PEMDs : 8 streams x 8 = 64 PEMDs, plus minimum of 9 blanks.

Alevins: Sample alevins at 4 tidal elevations if possible, with at least one being above tidal and oil influence as a stream control; 3 samplings would be below elevations where oil exposure would be possible. 4 groups total per stream.

Divide alevins into hydrocarbon samples (10 g minimum, about 40 fish; freeze) and CYP1A samples (10% phosphate-buffered formalin); 10 individuals, minimum.

Yield: 1 hydrocarbon sample per elevation, 10 replicate CYP1A measurements.

Number of alevin HC samples: 8 streams * 4 elevations = **32**

Number of alevin CYP fish: 8 streams * 4 elevations * 10 fish = **320**

Hot results from the PEMD results could trigger a selection of HC analyses of some alevins and CYP1A analyses in some samples. The strategy is to have excess collections at the site, evaluate the results from the PEMD deployments and then select some samples to be analyzed if appropriate.

Sediment samples

2 Oil patches (representative). Choose patches associated with PEMD placement.
2 from below-patch PEMD placement
4 Banks adjacent to each PEMD. Randomly choose side.
4 Stream channels (1 per elevation at each PEMD installment)
1 Blank
Σn = 13 per stream.
Total n = 8 streams * 12 sediment/stream = **104**

Rational for sediment samples: Sediment hydrocarbon data are intended to supplement PEMD data and allow a general picture of substrate contamination (or absence thereof) in and around stream channels. Although large amounts of oil are not expected in stream channels, previous results suggest some contamination in stream channels is plausible. Many of the samples would not be analyzed, but would be archived. Hot results at a stream could trigger some analyses.

Stream Mapping/tidal heights: Each stream sampled will be mapped, using planar laser level and stadium rod. This will be done to document the relationship between spawning gravels, sampling locations, and residual oil deposits. This is needed to determine if there is risk to spawning gravels or not. This is routine and can be done quickly at each stream site.

Mussel samples- if available

2 replicates , freeze

Place transect through mussel band & sample at random intervals.

Σn = 2 replicates / stream * 8 streams = **16**

Saltwater assessment

Suspend PEMDs from floats in bays to assess marine water influence on streams and on emergent fry. n = 6 -10 per bay × 2 bays = **20** **(6-8 of these would be associated with the sampling streams [and counted in the stream deployment numbers], and 12-14 would be added to get a more complete picture of the habitat contamination that receives the out-migrant fry).**

Timing

Tides work for all March dates. The best low tides are 3/4 to 3/9 and 3/14 to 3/20.

Target sampling start date is 3/14/05

An 8 d trip would allow 8 streams at 1 stream per day.

Plan: Start sampling early each day; get low stations as possible.

Dates	Low tide range	times	(Alternative tide)	Daylight hours:
3/4 to 3/11	0 to 0.7'	17:14 to 23:57	2.2 to 3.3' at 05:08 to 12:42	08:46 to 19:50
3/14 to 3/21	-0.1 to 0.6'	15:51 to 20:30	2.5 to 2.8' at 03:15 to 08:46	08:22 to 20:09

Stream & bay choices: to be decided in consultation with ADFG & NOS.

Retrieval: expect to retrieve PEMDs 20 to 60 d after placement. If possible, coordinate retrieval trip with other NOS needs. The retrieval trip would require about half the time of the deployment trip. Picking up the samples has to be done carefully, and with clean procedures.

Site procedure

Survey to determine elevations

Photodocument. Include aerial photography if possible.

Pump alevins

place anchors for PEMDs in parallel with pumping effort.

Record GPS coordinates. Triangulate to fixed points.

Build adjacent cairns. Photograph.

Wait >1 hour after pumping & removal of engine from stream vicinity before placing PEMDs to avoid possible contamination.

Place seawater float(s) with PEMD(s) during high tide periods..

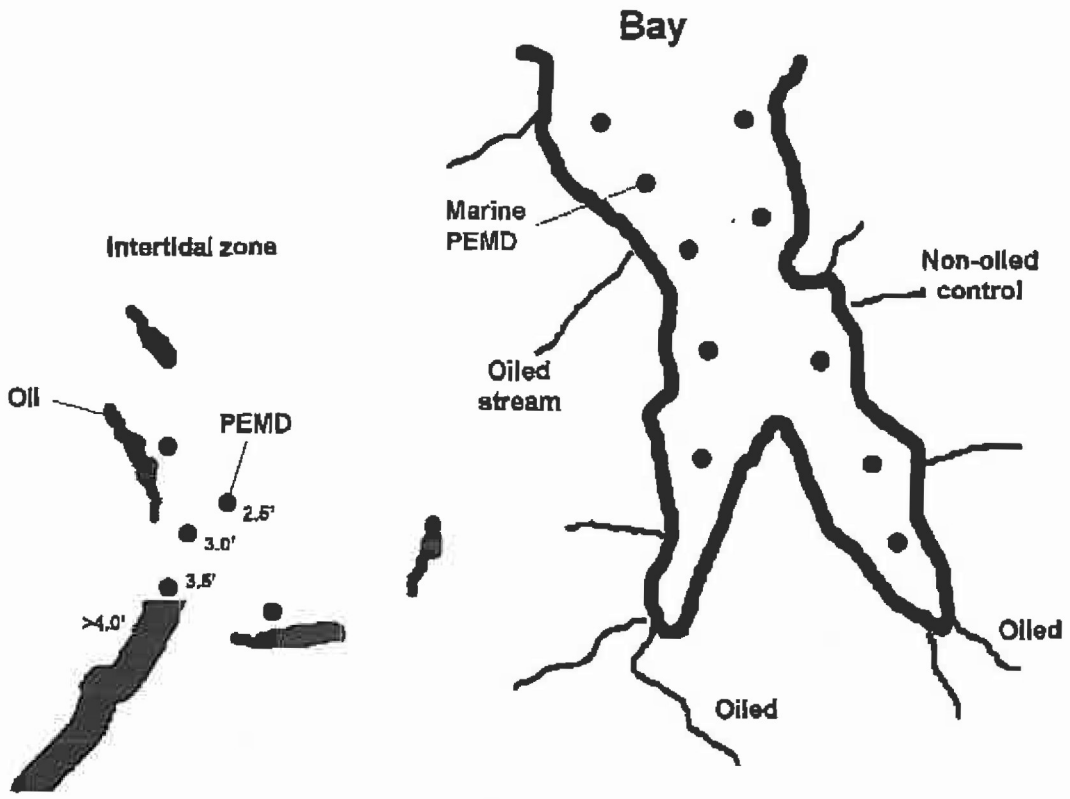

Fig. 1. Hypothetical PEMD sampling scheme (one of 2 bays with 3 oiled & 1 reference stream).

Streams:

1 at each elevation in stream (n = 4). Bury ~4 to 6" (10 to 15 cm). (1 anchor / device)
2 just downslope from adjacent high intertidal oil patches (hot controls, n = 2). (2 anchor/device)
2 air blanks, one to be opened during course of sampling on each trip. One blank could be reprogrammed for alternative use.
Σn = 8 PEMDs/stream * 8 streams = **64**

Bays:

Suspend PEMDs from floats, 1 m below surface. Water depth to be 30 feet (9 m)
Σn = 10 per bay × 2 bays = **20**

Total PEMDs: 84

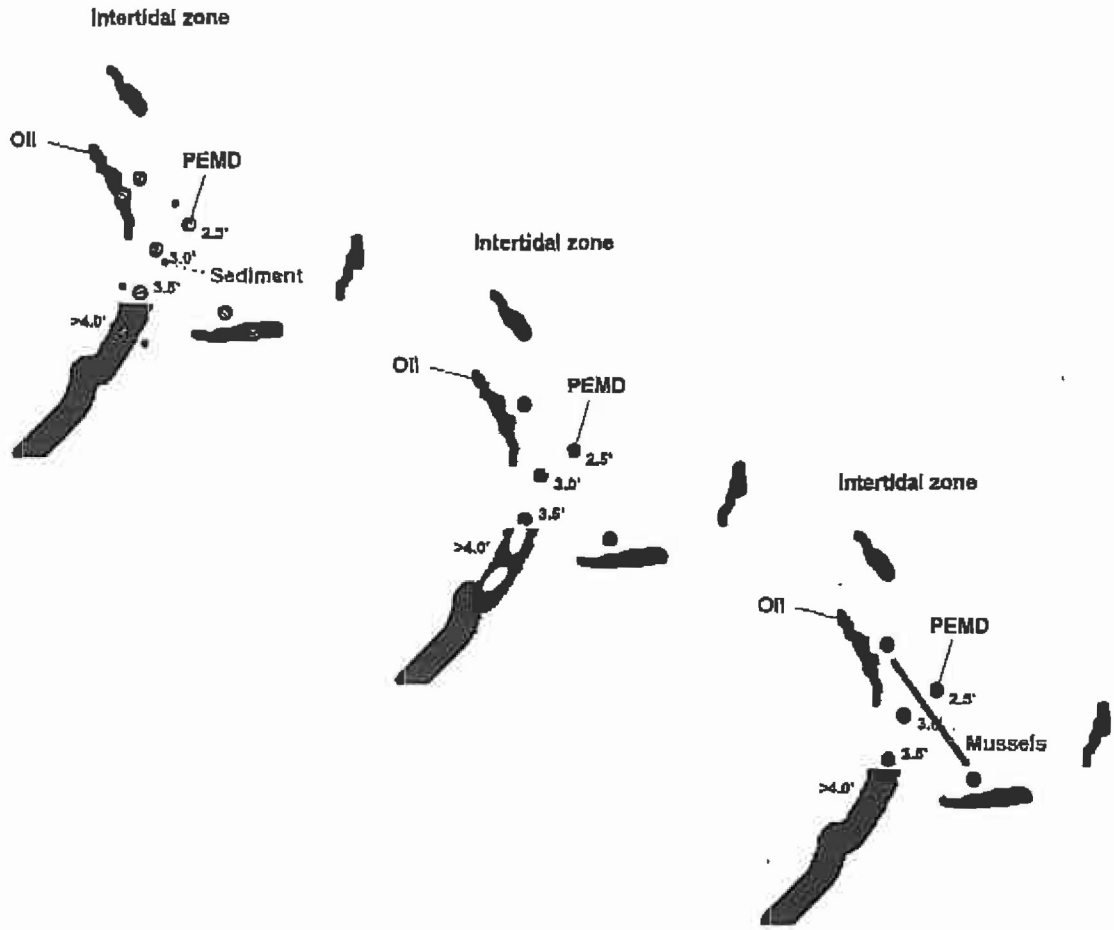

Fig. 2. Sampling schemes for sediment, alevins, & mussels.

Sediment

2 Oil samples from oil patches associated with PEMD placement.
2 sediment from below-patch PEMD placement
4 stream banks adjacent to each PEMD. Randomly choose side.
4 Stream channels (1 per elevation at each PEMD installment) + 1 Blank
Σn = 13 sediment/stream * 8 streams = **104**

Alevins: Sample alevins in intervals, 2.5' to 3.0', 3.0' to 3.5',... = 4 groups.
Divide alevins into hydrocarbon samples (10 g minimum, about 40 fish; freeze) and CYP1A samples (10% phosphate-buffered formalin); 10 individuals, minimum.
Σn = 4 hydrocarbon samples / stream * 8 streams = **32**
Σn = 10 CYP alevins / elevation * 4 elevations / stream * 8 streams = **320**

Mussels (if available):

2 replicates: place transect through mussel band & sample at random intervals.
Σn = 2 replicates / stream * 8 streams = **16**

Budget, Phase 1: Collection & base analyses					
Funding source	**Total cost (Out of pocket)**	NMFS (Contribution)			
NOS	68,996				
Matching	0				
Cost categories	NOS	NMFS	*n samples*	$/sample	total cost
1. Personnel salaries					
Mark Carls, PI	0	0			
Jeep Rice, co-PI	0	0			
Jeff Short, chemist	0	0			
Field crew- base salary (5 man weeks in field)	9500				
Overtime in field	1200				
2. Personnel fringe benefits					
COLA	2375	0			
Benefits	2470	0			
3. Travel					
Travel to Dutch Harbor	6600	0	3 people, 2 round trips each		
Freight to Dutch Harbor	500	0	Assume 2 trips x 100 lb for pump, 150 lb PEMDs, 50 lb jars, 300 lb other gear		
4. Equipment					
PEMDs	0	5000	Assume $50 value per PEMD * 50 + pump		
Duckbill anchors	1000	0	Assume $8 each for duckbill anchors * 100		
Floats, line, & anchors	1000	0			
5. Misc Supplies	1000	0			
PEMDs	28000	0	80	350	28000
mussels	5000	0	10	500	5000
sediment	5000	0	10	500	5000
water, filtrate	0	0	0	300	0
water, filter (particulate)	0	0	0	500	0
6. Contractual					
Vessel charter (9 days)	Unknown	0			
7. Total direct costs	63645	5000			
8. Indirect costs					
NOAA overhead	1981	0			
NMFS overhead	1070	0			
AFSC overhead	1338	0			
GSA rent	963	0			
9. Estimated project cost	68,996	5000			

Budget, Phase 2: decisionary, CYP1A and supplemental analyses						
Funding source	Total cost					
NOS	15000					
NMFS Matching	0					
Cost categories	NOS	NMFS	*n samples*	$/sample	total cost	
1. Personnel salaries						
None expected	0	0				
2. Supplemental analyses						
Some might be added after initial results are analyzed						
PEMDs	?	0				
mussels	?	0				
sediment	?	0				
6. Contractual						
Vessel charter (9 days)	0	0				
CYP analysis	10,000					
Contract labor to aid in data analysis	5000					
7. Total direct costs	15,000	0				
8. Indirect costs						
NOAA overhead	0	0				
NMFS overhead	0	0				
AFSC overhead	0	0				
GSA rent	0	0				
9. Total estimated supplemental costs	15,000	0				

United States Department of the Interior

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FAX TRANSMITTAL COVER SHEET

DATE: May 27, 2005

TO: Jennifer Kohout

FAX No.: 786-3350

FROM: Lisa Toussaint

SUBJECT: Selendang Ayu

NO. OF PAGES, INCLUDING COVER PAGE: 11

MESSAGE: In case you still need it, attached is a copy of a signed letter I found in my files from Craig O'Connor to Bert about the cooperative salmon study. Cheers!