

Informal notes – Western Harbour Tunnel Environmental Impact Statement

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Purpose of these notes

These informal notes have been prepared in response to requests from members of the community allow them to better understand technical aspects of the EIS relating to excavation, transport and treatment of contaminated sediments as part of the WHT project.

Experience

I have approximately 30 years experience in assessment and remediation of contaminated soil, groundwater and sediments.

From 1998 to 2008 I was a site auditor accredited by NSW EPA under the Contaminated Land Management Act 1997 to review consultant's investigation reports and remediation action plans (RAPs) and, after remediation was completed, to sign-off the suitability of the sites for intended uses.

I have experience in approximately 20 locations of sediment investigation and remediation works in Sydney Harbour and other locations.

Qualifications

I am qualified as an expert to comment only in issues relating to contaminated sediments in the EIS.

I am finalising a submission to Transport for NSW calling for amendment to the EIS in relation to excavation, transport and treatment of contaminated sediments and environmental protection measures that should be employed.

Contaminated sediments

The WHT project involves:

- excavation of sediments the EIS states to be contaminated in:
 - the corridor of the immersed tube tunnel, which extends from Yurulbin Point to Waverton (near the coal loader wharf)
 - cofferdams and construction support sites
 - White Bay
- transport of excavated sediments by barge to White Bay
- treatment of sediments at the White Bay treatment works prior to treated sediments being disposed to landfill

My three interests in WHT project:

- **Personal concerns**
 - I live in Birchgrove, adjacent to Snails Bay
 - I have concern relating to:
 - noise, odours
 - protection of marine environment during excavation works
 - duration of works

I would have preferred that the project provided increased public transport for the Inner West and northern beaches.

However, it looks like the project will go ahead and, if so, I want to ensure excavation, transport, treatment and disposal of contaminated sediments are carried out in accordance with industry best practice and with guidelines made by the EPA.

- **Community concerns**
 - noise, odours
 - contamination of marine environment
 - human health risks from contaminated sediment plumes
 - closure of

- Birchgrove ferry wharf for 2.5 years
- Yurulbin Point park for 3.5 years
- **Technical concerns** – significant technical deficiencies, elaborated below

Volume of contaminated sediments to be excavated and treated

The EIS stated that 142,500 cubic metres of contaminated sediments from White Bay would be excavated and treated at the White Bay treatment works.

The volume of contaminated sediments is grossly underestimated because it did not include contaminated sediments that would be excavated from:

- the corridor of the immersed tube tunnel
- Berrys Bay where contamination of sediments is known

It is possible that something like 300,000 cubic metres of contaminated sediments may be required to be excavated and treated.

Duty to report contamination

Guidelines made by the NSW EPA under the Contaminated Land Management Act require owners of land (which includes surface water and its bed) to report the presence of contamination to the EPA so that the EPA can determine if regulation of the contaminated site is warranted.

Search of the EPA's on-line register of land that has been reported indicated that contaminated sediments in the corridor of the immersed tube tunnel, White Bay and Berrys Bay have not been reported.

In my opinion, the EPA would regulate each of the locations where contaminated sediments are proposed to be excavated, given the large volumes and contamination identified in the EIS.

EIS – general comments

- Difficult to navigate – some chapters detailed, others sparse and some detail relating to contaminated sediments provided in more than one appendix
- All relevant information not provided in the EIS to allow critical assessment related to addressing contaminated sediments
- Prescriptive – sets out what measures will be implemented without critical assessment of other, alternative remediation measures
- Not possible to independently assess reliability of processes set out in the EIS due to inability to review source report relating to contamination of sediments

The EIS documents “this what will be done” – trust us that all will go well.

My objections to the EIS with respect to contaminated sediments are:

- the excavation and treatment of contaminated sediments are addressed as a construction project. Guidelines made by the EPA require contaminated materials, including sediments, to be addressed as a remediation project
- the failure of the EIS to document contamination characteristic, as was required by the Secretary's Environmental Assessment Requirements (SEARS)
- the failure of the EIS to address excavation of contaminated sediments as remediation works and thereby to address requirements of guidelines endorsed by the EPA relating to remediation of contaminated environmental media, as was required by SEARS
- the method described in the EIS to excavate sediments
- the method described in the EIS to prevent migration of suspended contaminated sediments during excavation works
- the method described in the EIS to address generation of odours in excavated contaminated sediments both at the locations proposed for the cofferdams and the Immersion Tube Tunnel, during transport by barge and at the location of the contaminated sediment treatment works at White Bay

- the failure of the EIS to provide details of treatment of contaminated sediments and contaminated water derived from the sediments
- the failure of the EIS to require excavation of contaminated sediments located in the western part of Berrys Bay within proposed construction support site WHT7.

The EIS does not provide information that allows independent assessment of the reliability of the methods adopted for the excavation, transport and treatment of contaminated sediments and environmental protection measures at the Immersion Tube Tunnel corridor and the White Bay treatment works.

Transport for NSW has withheld the consultants' report that addresses the concentrations of contaminants in the sediments

The EIS does not provide information that demonstrates:

- the sediments are actually contaminated
- the concentrations of the contaminants and their toxicities
- the locations, depth extents and quantities of contaminated sediments at each relevant work sites where contaminated sediments will be excavated
- that contaminated sediments can be treated so that they can be disposed to landfill.

The EIS gives no confidence that the methods adopted for excavation, transport and treatment of contaminated sediments represent best industry practice because the EIS did not critically assess all feasible remediation options and arrive at the preferred option.

Remediation consultants and contractors have evolved a rigorous quantitative process for assessing remediation methods and arriving at a quantitative ranking to select the preferred remediation method/s – this method should have been documented in the EIS.

In summary, with respect to the documentation in the EIS relating to excavation, treatment of contaminated sediments and environmental control measures, I am very disappointed with the lack of detail in the EIS relating to concentrations of contaminants, method for excavation of contaminated sediments, measures to protect the quality of water in Sydney Harbour, lack of robust measures to prevent contaminated sediments being mobilised, method for treating contaminated sediments so that they can be disposed to landfill and for uncontaminated materials proposed for ocean disposal.

Major issues

No proper consideration of regulatory requirements relating to contaminated materials

The EIS classifies the excavation and treatment of contaminated sediments as an engineering project – evidently the WHT project is proposed to proceed as set out in the EIS. In this respect the EIS provides no confidence that best practice is being implemented

The excavation/remediation of contaminated materials is controlled under the Contaminated Land Management Act (CLMA) and the disposal of these materials is controlled under the Protection of the Environment Operations Act (POEOA). Both acts are regulated strictly by the EPA.

With respect to excavation, treatment and disposal of contaminated sediments and measures to protect the environment, the EIS does comply with requirements of guidelines made by the EPA.

Other sediment remediation projects I have been involved with required extensive early consultation with regulatory authorities, engagement of a site auditor, engagement of a remediation consultant and consultation with remediation contractors and commercial NATA accredited laboratories to carry out treatment of sediment samples. The results of these processes have allowed finalisation of the preferred remediation method/s and of reliable measures to protect human health, the environment and the amenity of communities likely to be impacted by the works.

The EIS states that site auditor and additional investigations will be undertaken at an unspecified later time. However, this process appears to be flawed because the results of additional investigations may require changes to remediation methodology. This may lead to the requirement for different methods to be used – presumably this would require issue of an amended EIS for public consultation.

The EIS should have been informed by a program of detailed investigation to:

- characterise contamination
- select optimal remediation method/s
- odour assessment
- carry outfield and laboratory treatment trials to stabilise contaminated sediments
- obtain agreement with regulatory authorities

Critical omissions

The EIS did not refer to any process undertaken to confirm:

- the reliability of consultants' reports relating to contaminated sediments
- concentrations of contaminants
- distribution of contaminants
- quantities of contaminants at each proposed excavation site
- assessment of all feasible methods for remediating/treating sediments

Overall, the EIS doesn't provide any indication of the seriousness of the contamination in sediments in the Immersion Tube Tunnel corridor or in White Bay.

The EIS has addressed the contaminated sediments as a construction project.

Guidelines made by the NSW EPA require contaminated media (soil, groundwater, sediments) to be addressed as remediation projects.

Contaminants identified in the sediments

Sediments were stated in the EIS to contain a cocktail of chemicals:

- dioxins
- Tributyl tin (TBT)
- polynuclear aromatic hydrocarbons (PAHs)
- petroleum hydrocarbons
- organochlorine pesticides (OCPs)
- heavy metals, especially mercury, lead

Dioxins are known human carcinogens and are referred to as "gender benders" – dioxins were the prime consideration for the sediment remediation works at Homebush Bay adjacent to the former Lednez (previously Union Carbide for the manufacture of agent orange) and Allied feed sites to reduce dioxin concentrations in fish west of the Harbour Bridge.

TBT is has potent toxicity to the marine ecosystem, being used as an antifoulant on the hulls of vessels. The nearby Cockatoo Island ship building and repair yards were a likely source of TBT, which is now banned for use in Sydney Harbour. Mercury is also toxic to the marine ecosystem and to human health.

PAHs are known human health carcinogens

Contamination of sediments proposed to be excavated from the corridor for Immersion Tube Tunnel and from White Bay not characterised as required by Secretary's Environmental Assessment Requirements (SEARS).

Details of the physical (odour grain size, organic content,) and chemical nature of the contaminated sediments were not provided in the EIS.

Contamination within sediments in Berrys Bay

Part of Berrys Bay will be used as a construction support site and will involve movement of vessels in shallow water. This process will disturb sediments and result in suspension of contaminated sediments in the water column and its subsequent transport to other parts of Berrys Bay and to Sydney Harbour.

The EIS reported a cocktail of chemical contaminants in sediments within Berrys Bay, but no concentrations were provided.

The EIS did not address the requirement for excavation of contaminated sediments in the western part of Berrys Bay.

Reports relating to the contaminated sediments are available and the requirement for excavation of these sediments should have been addressed in the EIS.

Failure of TfNSW to provide critical report

After more than 6 weeks since I request the relevant consultants' report, Transport for NSW has not provided access to this report and stated the report is "commercial in confidence".

The response from Transport for NSW is outrageous because:

- it denies the ability for independent assessment of the reliability of the EIS for addressing contaminated sediments. The entire excavation program set out in the EIS is based on the reliability of the consultant's report
- it denies the communities' right to know what levels of contamination will be excavated, transported and treated in proximity to their homes and parks
- it does not allow the EIS to reliably address:
 - volumes of contaminated sediments
 - the measures required to be implemented to protect human health during excavation, transport and treatment of contaminated sediments
 - the measures required to be implemented for environmental protection
 - the times for excavation of contaminated sediments
 - the time for treatment of contaminated sediments

The concentration of contaminants in the sediments is of critical importance to every phase of the installation of the Immersion Tube Tunnel. If high concentrations of contaminants are present more stringent environmental control methods for excavation, transport and treatment of the sediments would be required.

The concentrations of contaminants in the sediments also have importance to the treatment of the contaminated sediments and for the discharge of water extracted from the sediments which would contain suspended fine-grained material.

If the consultants' report of the contamination is not reliable, the methods and times for all excavation and treatment of contaminated sediments in the WHT project would require revision

In my opinion, the EIS should not have been made available for public consultation until information was available to reliably document the issues set out above.

Excavation method

The EIS proposed excavation of contaminated sediments in the corridor of the Immersion Tube Tunnel and at White Bay was to be undertaken using a clamshell bucket operated from a barge and transport of excavated sediment to White Bay for treatment.

The EIS did not consider containment of suspended sediments if the clamshell bucket was operating effectively (i.e. able to be fully closed) or if closure of the bucket was not possible due to the presence of rocks, logs, metal objects and the like.

The EIS did not consider other methods for excavation of these sediments for the Immersion Tube Tunnel or White Bay.

However, the EIS proposed to excavate contaminated sediments from the Yurulbin Point cofferdam by first stabilising the sediments in place with a grout, by a method not stated, and subsequently excavating them.

The in place stabilisation method, was stated in the EIS to "improve its strength and make water-tight".

The stabilisation of contaminated sediments by grout injection is a method commonly used for remediation of contaminated sediments and for engineering purposes where soils contain large amounts of water.

Stabilisation of sediments is proposed for stabilising sediments in Kendall Bay that are contaminated by waste generated during operation of the Mortlake gasworks. Field and laboratory tests of stabilising the sediments have shown this method to be effective.

The stabilisation of contaminated sediments prior to excavation and transport to the White Bay treatment plant would have assisted in ease of handling of the sediments, less odours, less suspended sediments in Sydney Harbour and lessened the treatment required for contaminated sediments at White Bay and the time this plant needed to operate.

Protection of the marine ecosystem and human health

The EIS considered in Table 5 *Environmental risk analysis* that “Disturbance of contaminated sediments during marine construction activities to exhibit a high unmitigated risk, but after implementation of proposed environmental management measures the risk was considered to be low”.

However, the proposed environmental management measures set out in the EIS do not allow for malfunctions of equipment, accidental spillage of dredged sediments or release of suspended sediments from within the shallow floating silt curtain due to strong winds.

The EIS proposed that the quality of waters in western Sydney Harbour would be protected during excavation of contaminated sediments by employment of shallow silt curtains, but was as not specific on the configuration of the silt curtains.

The EIS stated it was not possible to deploy silt curtain to the seafloor, as is customary practice during excavation of contaminated sediments, due to the presence of strong currents. EIS was not specific on the configuration of the silt curtains or whether double curtains would be used.

However, full-depth bottom-sealed filter barriers (BSFB) that are anchored to the seafloor and are suitable for use in tidal marine environments where strong bottom currents, as strong as expected adjacent to Yurulbin Point and Balls Head. The deployment of BSFB would provide superior control of migration of suspended contaminated sediments to the marine environment. The EIS did not consider this option.

The EIS considered winds of 30 km/hour to be maximum at the 95th percentile. However, in the past year winds gusts exceeded 30 km/hour every month, with the maximum gust being 104 km/hour on two occasions.

Wind gust exceeding 30 km/hour occurred on 50 to 94 % of days over the past year.

Strong wind gust result in suspended sediment being swept from within the silt curtains and may not allow operation of dredges excavating the contaminated sediments and operations of barges transporting contaminated sediments to White Bay for treatment.

During excavation of contaminated sediments, models in the EIS identified that plumes of suspended contaminated sediments would extend from Balls Head and to extend over a significant part of Balls Head Bay.

The EIS did not address plumes the risk to human health or to the environment by migration of suspended contaminated sediments that would be expected to result of excavation for the Immersion Tube Tunnel or for construction works at Yurulbin Point. Consequently, the risk posed to human health and to the marine ecosystem of Snails Bay was not estimated for receptors Balmain Sailing Club, Dawn Fraser Pool and the beach at Elkington Park.

The community have concerns that the risk to residents of Birchgrove and to the marine environment was not addressed properly in the EIS.

The EIS failed to consider mishaps during the excavation of contaminated sediments and the impact of stronger winds that assessed in the EIS and the consequent loss of suspended sediments from within the proposed shallow silt curtains.

Appendix P of the EIS identified that fine-grained components of contaminated sediments was 69 % for soft silt and clay and 15 % for silty sand and that material lost to the waters of Sydney Harbour would be 1.5 %, giving rise to a loss of fine-grained contaminated sediments of approximately 1300 cubic metres.

The EIS did not provide any assurances from the EPA that this quantity of fine-grained contaminated sediments would be acceptable for release in to Sydney Harbour.

In addition, if the sediments contain medium to high concentrations of contaminants, more stringent environmental and human health protection measures than documented in the EIS would be required to be implemented and full-depth bottom-sealed filter barriers would be required.

Appendix P of the EIS stated that fine-grained components (fines) of the “soft silty clay” sediments to be excavated comprise materials less than 63 micrometres in size and that 1.5 % of these materials were “material lost” to the water column during dredging.

If these fines were not contained securely inside the silt curtains during excavation, they would migrate into the waters of Sydney Harbour. I have calculated that the volume of fines lost during excavation of the contaminated sediments would be approximately 1300 cubic metres.

In my opinion, the EPA would not permit the risk posed by 1300 cubic metres of contaminated fines to potentially be discharged into the waters of Sydney Harbour, particularly as the contaminants would be adsorbed to their surfaces and be likely ingested by fish, crustaceans and oysters.

As a precautionary measure to protect the quality of the waters of Sydney Harbour, the deployment of full-depth bottom-sealed filter barriers during excavation of contaminated sediments should have been addressed in detail in the EIS.

Odours

The EIS stated emission of odours from excavated sediments would not be required to be addressed because the sediments “would be wet”. However, it is widely understood that sediments from western Sydney Harbour and up-Harbour estuaries, when excavated and still wet, give rise to unpleasant odours, generally of hydrogen sulfide, known as “rotten egg gas”.

If the contaminated sediments were stabilised, as proposed for contaminated sediments excavated from the Yurulbin Point cofferdam, the odour issue was likely to be lessened and may present no issue to communities.

With respect to suppression of odours, to inform the EIS, measurements to quantify and suppress odours could have been carried out on samples of contaminated sediments collected during testing of the condition of the harbour sediments in or about 2017.

Measurement of the impact of odours to the community could have been carried out at Yurulbin Point by a commercial laboratory when small quantities of sediments were excavated

These tests can be provided on-site by commercial analytical laboratories.

Noise

The EIS did not address the cumulative noise from existing sources and the works proposed for excavating contaminated sediments and the installation of piled walls around the Yurulbin Point cofferdam, which is less than approximately 100 metres from residences.

The EIS did not address noise generated at the sediment treatment plant, which is less than 100 metres from residences and 50 metres from a public park.

Treatment of contaminated sediments

The EIS stated the contaminated sediments would be treated at the White Bay plant, but the EIS provided no details of the method/s that would be used to treat the sediments and extracted contaminated water.

The volume of contaminated sediments to be treated at White Bay did not include contaminated sediments in the corridor of the immersed tube tunnel or in Berrys Bay that are required to be excavated and treated.

The EIS stated an area of 1000 square metres (approximately 32 metres x 32 metres) was proposed for treatment of contaminated sediments. This area is far too small for this purpose in consideration of the areas required for dewatering and treating contaminated materials in other large remediation projects.

The requirements for disposal of sediments contaminated by dioxins, TBT, PAHs and heavy metals should have been agreed to by regulatory authorities and details of these requirements be provided in the EIS. Sufficient information for presentation to regulatory authorities should have been available in the consultants' report referenced in the EIS but not made available by Transport for NSW.

Laboratory tests for stabilising contaminated sediments should have been carried out and the preferred method/s provided in the EIS. Samples for testing would have been available from samples of contaminated sediments collected during testing of the condition of the harbour sediments in or about 2017.

Although, the cost for treatment and disposal of stabilised treated sediments cannot be assessed reliably from the information provided in the EIS, the cost may be of the order of \$100 million.

Requirement to amend the EIS with respect to contaminated sediments

In my opinion, with respect to excavation, transport, treatment of contaminated sediments and their disposal, an amendment to the EIS is required to be prepared for public consultation and is required to provide at least details of:

- quantitative estimates of the concentrations, physical properties, extent and volumes of contaminated sediments, particularly relating to contamination by dioxins, TBT and toxic heavy metals within the corridor of the Immersion Tube Tunnel, White Bay and Berrys Bay
- quantitative estimates of the nature, extent and volumes of sediments proposed for ocean disposal
- the benefits of stabilizing sediments prior to excavation
- duration of excavation of contaminated sediments within the cofferdams, the corridor of the Immersion Tube Tunnel and Berrys Bay
- confirmation of the adequacy of space for treatment of contaminated sediments at the White Bay facility
- duration of sediment treatment works at White Bay
- the nature and extent of:
 - cumulative noise from existing operations and sediment excavation works
 - odour from sediments and relevant odour suppression methods during excavation of the sediments and their, transport to and treatment at the White Bay treatment works
- improvements in methods for containing sediment suspended within the water column by excavation works to minimise to the extent practicable the migration of contaminated sediments from work areas to Balls Head Bay, Snails Bay and to the vicinity of Balmain Sailing Club, Dawn Fraser Pool and the beach at Elkington Park
- the method for ensuring uncontaminated sediments proposed for ocean disposal will not be impacted by contaminated sediments
- assurance from regulatory authorities that sediments proposed for ocean disposal meet criteria for this disposal option

- assurances from regulatory authorities that concentrations of chemical residuals remaining in treated water extracted from contaminated sediments can be disposed legally to Sydney Harbour or to sewer, as appropriate

Summary of non-compliance with SEARS relating to contaminated sediments

Immersion Tube Tunnel

The EIS did not address contamination characteristics of sediments to be excavated to allow installation of the Immersion Tube Tunnel.

With respect to sediments within the corridor of the Immersion Tube Tunnel, section 16.4 (of the EIS) stated Appendix M "...provides a qualitative assessment of the potential contamination risks and the need for remediation".

However, the above statement was made without reference to any details of the investigation of sediment quality and did not provide any details of quantitative results of chemical analyses and provided no data that addressed the reliability of the results relied upon to reach the conclusions made in this appendix.

In consequence of the above shortcomings, the conclusions made in the EIS with respect to contamination of sediments in the WHT corridor cannot be relied on and in this respect the EIS has not addressed the requirements of the SEARS.

Each of the issues set out below represents non-compliance with the SEARS in relation to excavation, transport and treatment of contaminated sediments

The EIS stated "...requirements for future remediation activities are identified Section 16.7". However, the data provided in Section 16.7 were not presented in accordance with guidelines made by or endorsed by the EPA and the requirement for future remediation activities remained unexplained in the EIS.

In particular, given the strong regulatory focus relating to dioxins in Sydney Harbour due to the impact to human health by accumulation of dioxins in fish, the community concern relating to these compounds and their extremely toxic impact to the marine ecosystem by TBT, the cursory reference to sediments within the WHT corridor being contaminated these chemical substances is a significant failing of the EIS.

The community deserves the EIS to provide reliable quantitative results of all potential contaminants identified in sediment samples referred to in the EIS, particularly for dioxins that have been subject to the emotionally charged issue of contamination of fish flesh, banning of commercial fishing in Sydney Harbour and limitations to consumption of fish caught west of the Sydney Harbour Bridge.

The EIS, and in particular Appendix M, provided no data on which the conclusions made in Appendix M can be independently assessed.

In contrast to the sparse and inconclusive results reported for contamination of sediments in Appendix M, data presented in Appendix N (*Technical Working Paper: Groundwater*), provided 31 tables of detailed results of various groundwater tests and tables of chemical analyses of groundwater samples and 27 Figures. In this respect Appendix N provided detailed quantitative results in stark contrast to the lack of quantitative information provided in Appendix M. A comparable amount of quantitative information should have been presented in Appendix M to properly characterise contaminated sediments.

I do not understand why the data relating to concentrations of contaminants in sediments set out in Appendix M was considered commercial in confidence when data relating to concentrations of contaminants in groundwater were provided in Appendix N.

It is a fatal flaw of the EIS that quantitative data relating to contaminated sediments was not provided in the EIS, given this information was expected to be available in the DGPA (2017a) report.

The failure of the EIS to provide quantitative concentrations, in particular of dioxins, TBT and mercury, unfortunately leads to the conclusion that the EIS has something to hide with respect to contamination of sediments and this omission devalues the integrity of the EIS.

Given the presence of unquantified concentrations and distributions of dioxins, TBT and other toxic chemical substances in sediments in the WHT corridor and TBT and heavy metals in sediments located in shallow waters of Berrys Bay, the EIS has not met the SEARS relating to characterisation of contamination of sediments and has presented no justifiable conclusions of whether sediments are contaminated and require remediation.

Contamination within Balls Head Bay

With respect to contamination of sediments in Balls Head Bay the EIS stated “The historical use of the coal loader wharf at Balls Head Road at Waverton may have caused localised contamination associated with the loading and unloading of materials (coal and potentially other materials) and general maritime activities”.

With respect to the likely presence of contamination within sediments of Balls Head Bay, in which the coal loader wharf is located, the EIS did not address the impact of the likely presence of contamination sourced from the former Waverton gasworks, which is located adjacent to Balls Head Bay approximately 600 metres north of the coal loader wharf.

In my experience contamination of sediments by a cocktail of chemical contaminants within sediments commonly extends for considerable distances from former gasworks into adjacent bays and that the contaminants are characterised by tars and other chemicals of concern that are toxic to human health and to the marine environment. In addition, contamination from gasworks waste, particularly tars, is characterised by persistent odours.

With respect to contamination of sediments in Balls Head Bay, the EIS failed to address characterisation of contaminants, which was required by the SEARS.

Contaminated sediments in Berrys Bay

The EIS did not address characterisation of contamination of sediments in shallow waters of Berrys Bay that were likely to be mobilised by use of the western part of Berrys Bay for the purpose of construction support site WHT7.

With respect to contamination of sediments in Balls Head Bay, the EIS failed to address contaminant characterisation, which was a requirement of the SEARS.

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