MEMORANDUM TO THE WATER POLICY TASK FORCE

February 10, 2004

TO: ***Members of the Water Policy Task Force***

FROM: ***Daniel E. Griset, Sr. Regional Planner, X895, griset@scag.ca.gov***

SUBJECT: ***A Study on the Health Implications of Perchlorate Ingestion and a State Water Resources Board Listening Session in the Region***

RECOMMENDATION:

Receive for future policy consideration of any new statewide stormwater policy proposals and for other findings on the health effects of perchlorate ingestion.

BACKGROUND:

Task Force member, Gerald Greene, D.Env., P.E., will summarize the findings of a recent study on the health effect of perchlorate study conducted by the National Research Council, as well as report on a State Water Resources Control Board "listening session" on stormwater issues held in Diamond Bar on January 12, 2005.

Perchlorate Study

The National Research Council's study on perchlorate, a chemical that in high doses can decrease thyroid function in humans and that has been found in groundwater within the SCAG region, suggests that daily ingestion of up to 0.0007 milligrams per kilogram of body weight can occur without adversely affecting the health of even the most sensitive populations. That amount is more than 20 times the "reference dose" proposed by the U.S. Environmental Protection Agency in a recent draft risk assessment.

Environmental releases of perchlorate -- a component of rocket fuel and fireworks -- have been discovered in 34 other states as well. More than 11 million people have perchlorate in their drinking water at concentrations of 4 parts per billion or higher. As it considers a first-ever national standard for acceptable levels of perchlorate in drinking water, USEPA has issued a series of draft risk assessments, each containing a reference dose upon which a standard could be based. Controversies over the scientific conclusions reached in the risk assessments, however, led the federal government to request that the National Research Council review the issue.

The most recent EPA risk assessment, published in 2002, proposes a daily reference dose of 0.00003 milligrams per kilogram (mg/kg) of body weight, which the agency said would correspond to a drinking-water

concentration of 1 part per billion based on certain assumptions about body weight and daily water consumption. The committee that wrote the Research Council report did not include a corresponding drinking-water concentration with its reference dose because the assumptions that are used to derive drinking-water standards involve public-policy choices that were beyond the committee's charge.

Perchlorate inhibits the thyroid's uptake of iodide, which is essential for the production of thyroid hormones. One potential consequence of that effect is low thyroid hormone production, or hypothyroidism. EPA has predicted that an ultimate consequence of that effect is the development of thyroid tumors -- a conclusion the agency based on the occurrence of a few thyroid tumors in rats exposed to perchlorate. The committee disagrees with EPA's conclusion and thinks that perchlorate exposure is unlikely to lead to thyroid tumors in humans. Humans are much less susceptible to disruption of thyroid function or formation of thyroid tumors than rats, and therefore the way rats responded to perchlorate exposure is not a good indicator of how humans would react.

In the past, high doses of perchlorate were used to treat patients with hyperthyroidism, or excessive thyroid hormone production, but a few patients had serious adverse reactions, and the use of perchlorate in this manner was largely abandoned. More recently, patients with hyperthyroidism have been treated effectively and safely with moderate doses of perchlorate for up to two years. Perchlorate has been administered to healthy subjects in doses ranging from 0.007 mg/kg to 9.2 mg/kg per day with no changes in thyroid hormone production to suggest any adverse effect on thyroid function. On the basis of these and other studies, the committee concluded that a perchlorate dose of more than 0.4 mg/kg per day would be required to adversely affect thyroid hormone production and cause hypothyroidism. However, the dose required to cause hypothyroidism in pregnant women, infants, children, and people with low iodide intake or pre-existing thyroid dysfunction might be lower.

There have been studies on the health effects of human populations exposed to perchlorate, but they were studies in which data were available for geographic areas, not for individuals. Relationships observed at the geographic level may not apply at the individual level, and therefore such studies cannot provide direct evidence of causation. They can support a possible association between two events, however, which allowed the committee to reach some conclusions based on those studies. In particular, the committee found that the available evidence is not consistent with an association between exposure to perchlorate in the drinking water at concentrations up to 120 parts per billion during pregnancy and changes in thyroid hormone production in normal-birth weight, full-term newborn infants. The evidence is insufficient to determine whether or not there is an association between perchlorate exposure and adverse neurodevelopmental outcomes in children.

Because of the weaknesses in the studies of the health effects in human populations exposed to perchlorate in the environment, the committee recommended against using them to determine a reference dose. Rather, it recommended using a 2002 clinical study in which groups of healthy men and women were administered perchlorate in daily doses ranging from 0.007 mg/kg to 0.5 mg/kg for 14 days. The study found no statistically significant inhibition of iodide uptake by the thyroid at the 0.007 mg/kg daily dose. The findings in this study are supported by the results in four other studies of healthy subjects, including a six-month study. The committee recommended that an uncertainty factor of 10 be applied to the 0.007 mg/kg per day level to protect the fetuses of pregnant women who might have hypothyroidism or iodide deficiency. This results in the

0.0007 mg/kg per day reference dose recommended in the report.

The committee emphasized that the reference dose should be based on inhibition of iodide uptake by the thyroid in humans, which is not an adverse effect but the key biochemical event that precedes any health effects caused by perchlorate exposure. The committee called this a "conservative, health-protective approach to perchlorate risk assessment." It also suggested studies that have the potential to more precisely define "safe" perchlorate exposures. Future findings could result in the need to adjust the reference dose recommended in the report, the committee acknowledged.

The study was sponsored by the U.S. Environmental Protection Agency, the U.S. Department of Defense, the U.S. Department of Energy, and NASA. The National Research Council is the principal operating arm of the National Academy of Sciences and the National Academy of Engineering. It is a private, nonprofit institution that provides scientific and technical advice under a congressional charter.

NOTE: The study report is can be seen at http://www.nap.edu/books/0309095689/html/

State Water Resources Control Board's Listening Session

On January 12, 2005 the State Board (SWRCB) held its southern California Listening Session in Diamond Bar to consider whether there was a need for a statewide guidance document that would assist Regional Water Boards in writing NPDES storm water permits, evaluating compliance, and assessing effectiveness. The meeting was well attended, including representatives from environmental organizations, local governments, development and manufacturing industries.

Environmental advocates called for increased monitoring, additional funding, and the retention of numeric requirements associated with the California Toxics Rule (CTR). These advocates favored inter-jurisdictional consistency, enforcement actions, and the attainment of numeric (beneficial use) objectives.

In contrast, the other 2 dozen speakers noted a variety of challenges facing the current programs and suggested steps that could increase interagency cooperation:

1) Development of the Maximum Extent Practicable (MEP) definition that supports an iterative process for water quality attainment;
2) The State study of future looking program costs;
3) Assessment of the impacts of Proposition 218 limits on assessment and utility district formation;
4) Limitation of program and liability transfers to local agencies without related funding support;
5) Local support for better connecting the Basin Plan with Porter Cologne provisions;
6) Greater responsiveness by Boards to interagency requests and initiatives;
7) Improved uniformity in water quality standards defined by discharge permits within a watershed;
8) Need for a "safe harbor" provision in General Industrial Activities Stormwater Permits (GISAP) until a majority of applicable facilities have been permitted;
9) Development of key information on BMP effectiveness and costs;

10) Greater emphasis on regional SUSMP efforts and projects;
11) Current regional programs can be too scattered and provide only limited assessments of program effectiveness;
12) Need for a greater emphasis on Board/Municipal inspections that utilize existing GI/CASP self monitoring data for identifying and correcting non compliance of dischargers;
13) Shortage of resources for implementing of existing programs;
14) Benefits of focusing limited resources on attacking major polluters rather defending zero numeric standards;
15) Extending MS4, GIASP and GCASP permits while new policy is being developed;
16) Need for better inter-agency synchronization and coordination in water quality, air quality, pesticide and land use regulations;
17) Need for a "safe harbor" with high volume storm flows and discharges from GI/CASP facilities that become MS4 stormwater permit discharges.